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MATERIALS

FOR A

CARCINOLOGICAL FAUNA OF INDIA.

No. 2.

THE BRACHYURA OXYSTOMA.

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BY

A. ALCOCK, M.B., C.M.Z.S.,

SUPERINTENDENT OF THE INDIAN MUSEUM.

[*Reprinted from the "Journal Asiatic Society of Bengal," Vol. LXV, Part II, No.* 2, 1896.]

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INVERTEBRATE
ZOOLOGY
Crustacea

CALCUTTA:

PRINTED AT THE BAPTIST MISSION PRESS.

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From the Journal, Asiatic Society of Bengal, Vol. LXIV, Part II, No. 2, 1895.

Description of a New Species of Oxyrhynch Crab of the Genus Parthenope.

—*By* A. Alcock, M. B., C. M. Z. S., *Superintendent of the Indian Museum.*

[Read 3rd July.]

The species here described is a true *Parthenope* as delimited by Miers, Journ. Linn. Soc., Zool., Vol. XIV. 1879, p. 668.

Parthenope investigatoris, n. sp.

Carapace almost equilaterally triangular, the sides very slightly curved: its surface is deeply eroded and rugose as in *P. horrida* and *spinosissima*, but is almost devoid of the sharp tubercles found in those species: the antero-lateral borders are slightly crenulate: the produced postero-lateral angle is rounded and nearly smooth: the posterior border bears five small eroded lobules —— a very small one in the middle line, with two larger ones on either side —— with intervening granules. The gastric region is enormously inflated as in *P. spinosissima*, and descends almost vertically to the vertically deflexed rostrum, the latter being fused with the interantennulary tooth. The hepatic regions are rounded laterally, not strongly angulated as they are in *P. horrida* and *spinosissima*. The external maxillipeds, when closed, have the inner edges in the closest contact throughout.

The chelipeds have the *merus* very short and squat —— its breadth about two-thirds of its length —— with two compressed teeth on its short anterior (inner) border, a few blunt teeth followed by a blunt lobe on its posterior (outer) border, a strong tubercle in the middle of its upper surface, and numerous pearly tubercles and nodules on its lower surface: the *carpus* is granular and pustular: the *hand* has five sharp almost equal sized teeth on the lower border (two of them being on the immobile finger), several large nodules on the outer surface, and several large unequal sized spiny lobules on its inner surface: the *mobile finger* is spiny.

The ambulatory legs are compressed: the *merus* is compressed-trigonal, with the edges, especially the anterior edge, spiny: the *carpus* is indistinctly nodular: the *propodus* is also slightly nodular, with a few spinules on its posterior margin: the *dactylus* is closely covered with spinules up to its tip.

The sternum, in the female, is excavated between the chelipeds.

The abdominal terga, in the female, are raised into strong quadrangular convexities down the middle line, and on either side near the edge.

Loc.—Pedro Shoal, ? depth; and Laccadives, 28 fms.

Length of carapace of largest specimen (female) 45 millim., greatest breadth 61 millim.

The position of the above species in the *key to the Indian species of the genus* Parthenope, page 279 *ante* is thus shown :—

I. Carapace remarkably rugose (or spinose); chelipeds of the ordinary *Lambrus* form :—

1. Carapace somewhat pentagonal, not vertically deflexed from the front of the gastric region: abdominal terga of the female with a series of large eroded pits down either side ..... *P. horrida.*

2. Carapace somewhat equilaterally triangular, vertically deflexed from the front of the gastric region: abdominal terga of the female with a series of convexities or nodules down the middle line, and on either side—

i. Edges of carapace very strongly spinate: carpus of chelipeds and of ambulatory legs (like all the other parts of the body) strongly spinate: abdominal convexities of female spinate ..... *P. spinosissima.*

ii. Spinature very little developed: edges of carapace crenulate: carpus of chelipeds and of ambulatory legs granular or nodular: abdominal convexities of female not spinate ..... *P. investigatoris.*

II. The whole body and all the appendages beset with delicate paxilliform tubercles which unite to form a lace-work or frosting: chelipeds tapering, with long slender spiny fingers which are nearly as long as the palm ..... *P. (Parthenomerus) efflorescens.*

From the Journal, Asiatic Society of Bengal, Vol. LXV. Part II, No. 2, 1896.

Materials for a Carcinological Fauna of India. No. 2. *The Brachyura Oxystoma.*—*By* A. Alcock, M.B., C.M.Z.S., *Superintendent of the Indian Museum.*

Plates VI—VIII.

Received 7th May. Read 3rd June.

The limits of the Tribe of Oxystoma here adopted are those originally established by De Haan in the Fauna Japonica, and since recognized by Ortmann in his account of the Decapod Crustacea of the Strasburg Museum.

I can hardly, however, go as far as Ortmann in uniting the *Leucosiidæ* and *Raninidæ* in one section, Leucosiinea, co-ordinate in value with the Dorippinea and Calappinea. Rather, it seems to me, the affinities of the *Raninidæ* are, through *Cyclodorippe*, with the *Dorippidæ*. But on the whole it seems enough to recognize the *Raninidæ* as true Oxystomes of equal rank with the *Calappidæ*, *Leucosiidæ* and *Dorippidæ*, just as De Haan practically does.

No one who has examined any of the deep-sea Dorippoids can, I think, find any difficulty in accepting De Haan's comprehensive views of the relations of the Oxystoma.

For instance, in the Indian genus *Cymonomops** (which differs but little from *Cyclodorippe*), although the general external form is as plainly as possible that of *Dorippe*, yet a detailed examination shows a number of Raninoid characters:—The chelipeds are Raninoid, so are the external maxillipeds (especially in their long narrow merus and short narrow exognath), so are the antennules: the fact also that the afferent branchial openings are not in front of the bases of the chelipeds is suggestive. In *Cyclodorippe*, moreover, the oviducts open, as in the *Raninidæ*, on the bases of the third pair of legs.

We have, in fact, in some of these deep-sea forms the clearest evidence of the close relation of the *Ranina* type to the *Dorippe* type, and quite sufficient justification for accepting De Haan's scheme of the Oxystoma almost without modification.

The following is a list of the known Indian genera of Oxystomes:—

Calappidæ Calappinæ:—*Calappa*, *Mursia*, *Cryptosoma*.

Calappidæ Matutinæ:—*Matuta*.

Leucosiidæ Leucosiinæ:—*Actæomorpha*, *Oreophorus*, *Tlos*, *Heteronucia (nov.)*, *Ebalia*, *Nursia*, *Nucia*, *Parilia*, *Randallia*, *Myra*, *Leucosia*, *Onychomorpha*, *Philyra*, *Pseudophilyra*.

Leucosiidæ Iliinæ:—*Myrodes*, *Iphiculus*, *Pariphiculus (nov.)*, *Nursilia*, *Heterolithadia*, *Arcania*, *Ixa*.

Dorippidæ Dorippinæ:—*Dorippe*, *Ethusa*.

Dorippidæ Tymolinæ:—*Cymonomops*.

Raninidæ:—*Notopus*, *Raninoides*, *Lyreidus*.

Tribe OXYSTOMA or LEUCOSOIDEA.

Oxystomes, Milne-Edwards, Hist. Nat. Crust. II. 96 (*partim*), and *Raniniens* Milne-Edwards *op. cit.* II. 190.

Oxystomata, De Haan, Faun. Japon. Crust. pp. 111–119.

Leucosoidea vel *Oxystomata*, Dana, U. S. Expl. Exp. Crust. I. 389, and *Raninidea* vel *Anomura Leucosidica*, Dana, *op. cit.* pp. 400, 403.

Oxystomata or *Leucosiidea*, Miers, Challenger Brachyura, p. 337, and *Raninidea*, Henderson, Challenger Anomura, p. 26.

Oxystomata, Ortmann, Zool. Jahrbuch., Syst., VI. 1892, pp. 550, 551.

Epistome reduced or absent. The efferent branchial channels terminate in the middle of the buccal area, the buccal cavern is therefore produced forwards and is generally of an elongate triangular shape; and the efferent channels themselves, whether covered by the external maxillipeds or not, are immediately closed in by an elongate lamellar process of the exopodites of the first maxillipeds.

* Illustrations of the Zoology of the 'Investigator,' Crustacea pl. xiv. fig. 9.

The afferent branchial openings are found either in the usual place in front of the bases of the chelipeds, or at the sides of the endostome.

Branchiæ from six to nine on either side.

The antennules fold either longitudinally or obliquely, very rarely transversely.

In the male the genital ducts protrude either through the bases of the fifth pair of legs or through the fifth thoracic sternum close by.

The Oxystoma may be divided into four families as follows:—

Family I. *Calappidæ.* Carapace of the ordinary brachyurous shape. The afferent branchial openings are found in front of the bases of the chelipeds. The antennæ are small. The legs are normal in position. The vasa deferentia perforate the bases of the fifth pair of legs. The branchiæ are nine in number on either side. The external maxillipeds either completely cover the buccal cavern and have their palp hidden in repose (*Matutinæ*), or do not close the buccal cavern and have their palp always exposed (*Calappinæ*).

Family II. *Leucosiidæ.* The carapace is of the ordinary brachyurous shape. The afferent branchial channels are found on either side of the endostome. The vasa deferentia perforate the sternum near the bases of the fifth pair of legs. The legs are normal in position. The antennæ are small, sometimes obsolete. The external maxillipeds completely close the buccal cavern and have the palp completely hidden in repose. The branchiæ are less than nine (six in many forms) in number on either side.

Family III. *Dorippidæ.* The carapace is short, so that the first two or three abdominal terga, instead of being tucked up beneath it, are completely exposed in the dorsal plane of the body. The last two pairs of legs are much reduced in size and have a peculiar position in the dorsal plane of the body. The antennæ are large. The antennules are usually too large to fold into their fossettes. The vasa deferentia emerge through the sternum near the bases of the fifth pair of legs. The afferent branchial openings are found either in front of the bases of the chelipeds or not. The external maxillipeds either do cover the buccal frame (*Tymolinæ*), or do not (*Dorippinæ*). The branchiæ are less than nine in number on either side.

Family IV. *Raninidæ.* Carapace remarkably elongate, but not covering the abdominal terga, the first 4 or 5 of which lie exposed in the dorsal plane of the body. The last pair of legs also is raised in the dorsal plane of the body. The antennæ are large. The antennules also are large, and do not fold into fossettes. The vasa deferentia protrude through the bases of the fifth pair of legs: *the oviducts pierce the bases*

of the third pair of legs. The sternum is broad anteriorly, very narrow or linear posteriorly. The afferent branchial openings are not found in front of the bases of the chelipeds, and afferent currents probably reach the branchial chamber between the posterior border of the carapace and the bases of the last pair of legs. The external maxillipeds completely cover the buccal cavern, and their palp is concealed in repose: their exopodite is but little longer than the ischium. The branchiæ are less than nine in number on either side.

Family CALAPPIDÆ.

Calappiens, Milne-Edwards, Hist. Nat. Crust. II. 100.
Calappidea and *Matutoidea*, De Haan, Faun. Japon. Crust. pp. 124, 126.
Calappidæ and *Matutidæ*, Dana, U. S. Expl. Exp., Crust. I. pp. 390, 391.
Calappidæ and *Matutidæ*, Miers, 'Challenger' Brachyura, pp. 282, 293.

Carapace more or less oval or subcircular, commonly with either (1) a single denticle or a heavy spine at the junction of the antero-lateral and postero-lateral borders, or (2) a postero-lateral vault-like expansion over the ambulatory legs (*Calappa*). Front generally about as wide as the orbit. The antennules generally fold obliquely. The antennæ are generally small.

The external maxillipeds may (*Matutinæ*) or may not (*Calappinæ*) completely close the buccal cavern, and their palp may (*Matutinæ*) or may not (*Calappinæ*) be concealed in repose.

The efferent branchial channels together form a deep channel in the endostome the channel being covered in below by a long lamellar process of the internal (first) maxillipeds. The afferent branchial openings have the normal position in front of the bases of the chelipeds.

The chelipeds are ponderous and greatly enlarged, and are practically symmetrical (except sometimes as to the fingers)*: the hands especially are of great size—forming often the most conspicuous part of the chelipeds, and are so curved as to shut closely against the pterygostomian regions of the carapace, thus acting as a sort of buckler.

The abdomen usually (always in Indian forms) consists in the adult male of 5 segments, the 3rd–5th terga being fused together, and of 7 separate segments in the female (and young male). The branchiæ in all Indian forms are nine in number on either side.

In the male the vasa deferentia perforate the bases of the fifth pair of legs.

In the following list of genera belonging to the family *Calappidæ*

* In the exotic genus *Platymera* one cheliped is larger than the other.

those belonging to the Indian fauna are printed in Roman type, and those known to me by autopsy are marked with an asterisk.

Family **Calappidæ.**

Subfamily I. *Calappinæ.*

Alliance I. Calappoida.

* Calappa.

Paracyclois, Miers, 'Challenger' Brachyura, p. 288, pl. xxiv. figs. 1, 1*a*–1*c*.

* *Platymera*, Milne-Edwards, Hist. Nat. Crust. II. 107; and Milne-Edwards and Lucas, Voy. Amer. Merid. Crust. pl. xiii.

* Mursia.

Acanthocarpus, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 152; and A. Milne-Edwards, Bull. Mus. Comp. Zool. VIII. 1880-81, pl. i.

* Cryptosoma.

Alliance II. Orithyioida.

Orithyia, Fabr., Milne-Edwards, Hist. Nat. Crust. II. 110, and in Cuvier, Règne Animal, Crust., pl. viii. figs. 1, 1*a*–1*c*.

Subfamily II. *Matutinæ.*

Alliance I. Matutoida.

* Matuta.

Alliance II. Hepatoida.

Osachila, Stimpson, Bull. Mus. Comp. Zool., II. 1870-71, p. 154; and Faxon, 'Albatross' Stalk-eyed Crustacea, pl. v. figs. 2, 2*a*, 2*b*.

* *Hepatus*, Latr., Milne-Edwards, Hist. Nat. Crust. II. 116, and in Cuvier Règne Animal, Crust. pl. xiii. figs. 2, 2*a*–*i*.

Subfamily CALAPPINÆ.

Calappidæ, Dana *loc. cit.*, and Miers *loc. cit.*

Merus of external maxillipeds not elongate and acute (except in the exotic and somewhat aberrant genus *Orithyia*), and never concealing the palp in repose. Legs gressorial (except in the exotic genus *Orithyia*.)

Subfamily MATUTINÆ.

Matutidæ, Dana, *loc. cit.*, and Miers, *loc. cit.*

Merus of external maxillipeds elongate and acute, entirely concealing the palp in repose. Legs natatorial.

Key to the Indian genera of Calappidæ.

I. *Calappinæ*:—Merus of external maxillipeds not elongate or acute, and never concealing the flagellum in repose: ambulatory legs gressorial:—

1. Carapace with a postero-lateral shield-like expansion or series of broad serrations, forming a vault beneath which the four ambulatory legs can be completely or largely concealed in flexion: basal joint of antennæ much dilated ... ... CALAPPA.
2. Carapace without any trace of a postero-lateral shield-like expansion: basal joint of antennæ slender:—
   i. Carapace transversely oval, with a large spine at the junction of the antero-lateral and postero-lateral borders ... MURSIA.
   ii. Carapace sub-circular or longitudinally suboval, with a small denticle at the junction of the antero-lateral and postero-lateral borders ... ... CRYPTOSOMA. p. 151

II. *Matutinæ*:—Merus of external maxillipeds elongate and acute, and completely concealing the flagellum in repose: ambulatory legs in the form of swimming paddles. (Carapace subcircular, with a large spine at the junction of the antero-lateral and postero-lateral borders: antennæ rudimentary) ... ... MATUTA. p. 153

CALAPPA, Fabricius, Edw.

Calappa, Fabricius, Ent. Syst., Suppl. p. 345.

Calappa, Milne-Edwards, Hist. Nat. Crust. II. 102.

Calappa, Lophos, Camara, Gallus, De Haan, Fauna Japonica, Crust. pp. 69, 70, 125.

Calappa, Miers, 'Challenger' Brachyura, p. 283.

Carapace strongly convex, rounded in front, much broadened behind by a pair of clypeiform expansions, or wings, beneath which the four pairs of ambulatory legs are concealed in flexion.

Front small, somewhat triangular, projecting little or not at all beyond the level of the orbits, bilobed.

Orbits small, circular: eyestalks short and thick.

The antennules fold nearly vertically beneath the front.

The basal joint of the antennæ is very broad, and fills a wide hiatus at the inner angle of the orbit: the flagellum is short usually.

There is no distinct epistome; but the endostome is prolonged, as far as the antennulary fossæ, in the form of a canal, which is divided longitudinally by a deep vertical septum into two channels, each channel being completed below by a lamellar process from the first pair of maxillipeds.

The external maxillipeds do not meet across the mouth, but leave exposed between them the mandibles, and, in front of them, the aforementioned plate-like prolongations from the first pair of maxillipeds.

The chelipeds are very large, and in flexion are closely apposed to the front half of the carapace, so as to form a sort of buckler: the meropodite, or "arm," has near its distal end, externally, a transverse wing-like expansion, complementary to the wing-like expansions of the carapace: the propodite, or "hand," is strongly compressed, its upper border forming a high, sharply dentate or crenulate, crest. Except for the fingers, the chelipeds are equal and symmetrical; both the fingers, namely, of one hand have on their outer aspect, near the base, a stout projecting lobule.

The abdomen in the adult male* consists of only five separate pieces, owing to the fusion of the 3rd, 4th and 5th somites. In the young male, as in the adult female, it consists of seven separate somites.

Key to the Indian species of Calappa.

I. Extreme length of the carapace either quite or nearly equal to its extreme breadth:—
  1. Carapace as long as broad: clypeiform expansions ill developed:—
    i. Carapace sub-circular, with 7 longitudinal parallel lines of bullous tubercles ... ... *C. pustulosa.*
    ii. Carapace sub-quadrangular, without regular lines of tubercles ... *C. wood-masoni.*
  2. Carapace a little broader than long: clypeiform expansions well-developed ... *C. gallus.*

* ? *C. gallus*, of which species I have not seen adult males.

II. Extreme length of the carapace about two-thirds of its extreme breadth: free margin of clypeiform expansions strongly laciniate:—

1. Carapace, in the adult, nearly smooth: clypeiform expansions well-developed. [*Inhabitants of shallow water*]:—

i. Anterior border of endostomial septum deeply concave: no spine in the middle line, on the posterior border ... ... *C. lophos.*

ii. Anterior border of endostomial septum strongly convex: a spine in the middle line, on the posterior border ... ... *C. philargius.*

2. Carapace, in the adult, more or less covered with pustular tubercles: clypeiform expansions little developed. [*Habitat deep water*] ... ... *C. exanthematosa.*

III. Extreme length of the carapace very much less than two-thirds of its extreme breadth: free margin of clypeiform expansions either smooth throughout, or broadly dentate:—

1. Extreme length of carapace rather more than half its extreme breadth: surface of carapace with numerous sharpish tubercles: antero-lateral border of clypeiform expansions with broad teeth the points of which are either acute or have the form of up-curved spines:—

i. Antero-lateral border of carapace coarsely serrate ... ... *C. hepatica.*

ii. Antero-lateral border of carapace, and of clypeiform expansions, with strongly up-curved spines ... *C. spinosissima.*

2. Extreme length of carapace rather less than half its extreme breadth: surface of carapace with wavy beaded lines only: free edge of clypeiform expansions smoothly moulded and entire ... *C. fornicata.*

1. *Calappa fornicata*, Fabr.

Cancer calappoides, Rumph, Amboinsche Rariteitkamer I. 21, pl. xi. figs. 2, 3.

Cancer heraclcoticus, Seba, Thesaurus III. 51, pl. xx. figs. 7, 8.

Cancer calappa, Linn., Mus. Lud. Ulr. p. 449, and Syst. Nat., 12th ed. I. ii. 1048: Herbst, Krabben I. ii. 196, pl. xii. figs. 73, 74: Fabricius, Ent. Syst. II. 454.

Calappa fornicata, Fabricius, Ent. Syst. Suppl. p. 345: Bosc, Hist. Nat. Crust. I. 183 (*nec* pl. iii. fig. 3): Latreille, Hist. Nat. Crust. et. Ins. V. 394: Desmarest, Consid. Gen. Crust. p. 109: Milne-Edwards, Hist. Nat. Crust., II. 106: Dana, U. S. Expl. Exped., Crust. pt. I. p. 394, pl. xxv. fig. 1: A. Milne-Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 72, and X. 1874, p. 56: Hilgendorf in Von Der Decken's Reisen in Ost.-Afr. III. i. p. 92: Brito Capello, Jorn. Sci. Lisboa, III. 1870-71, p. 133, pl. ii. fig. 5: E. Nauck, Zeits. Wiss. Zool. xxxiv. 1880, p. 46 (*gastric teeth*): A. Ortmann, Zool. Jahrbucher, Syst. etc. VI. 1892, p. 569.

Carapace in length less than half the extreme breadth; its surface nearly smooth anteriorly, marked with transverse wavy beaded lines posteriorly; its antero-lateral borders crenulated.

Clypeiform expansions very large, their breadth (transverse measurement) equal to their length (oblique antero-posterior measurement); their edge smoothly moulded, and in unbroken continuity with the smoothly moulded posterior border of the carapace. Outer part of the pterygostomian regions densely hairy.

Front slightly projecting beyond the level of the orbits, bilobed, its breadth at the tip rather less than the breadth of the orbit.

Endostomial septum extending vertically from the level of the front to the level of the mouth; its anterior border strongly convex and projecting.

Transverse wing-like expansion near the distal end of the arm with its edge smooth and entire.

Outer surface of palm with squamiform tubercles and transverse wavy beaded ridges: upper margin, or crest, of palm bluntly dentate.

Three specimens, including a male and ovigerous female of remarkable size, are in the Museum collection, from the Andamans.

The eggs are singularly minute.

2. *Calappa hepatica* (Linn.)

Cancer hepaticus, Linn., Mus. Lud. Ulr., p. 448, and Syst. Nat. ed. xii. I. ii. 1048.

Calappa hepatica, De Haan, Faun. Japon. Crust., p. 70: Miers, Cat. Crust. New Zealand, p. 55, and Phil. Trans. Roy Soc. Vol. 168, 1879, p. 491, and Zoology H. M. S. 'Alert' pp. 185, 257, 518, 550, and 'Challenger' Brachyura, p. 285: Haswell, Cat. Austral. Crust., p. 136: Filhol, Crust. Nouvelle Zélande, p. 406: [Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 249]: A. Ortmann, Zool. Jahrbuch., Syst. etc., VI. 1892, p. 568: J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 395.

Cancer tuberculatus, Herbst. Krabben, I. ii. 204, pl. xiii. fig. 78: Fabricius, Ent. Syst. II. 454.

Calappa tuberculata, Fabricius, Ent. Syst., Suppl., p 345 : Bosc, Hist. Nat. Crust. I. 183: Latreille, Hist. Nat. Crust. et. Ins., V. 393: Desmarest, Consid. Gen. Crust., p. 109, pl. 10, fig. 1: Milne-Edwards, Hist. Nat. Crust., II. 106: Owen, Zool. Beechey's Voy. "Blossom," Crust. p. 80: Krauss, Südafr. Crust., p. 52: Dana, U. S. Expl. Exp., Crust. pt. I. p. 393: Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 162: Heller, Crust. Roth. Meer. in SB. Ak. Wien, 1861, XLIII. p. 372, and 'Novara' Crust. p. 69: Hess, Archiv. fur Naturges. XXXI. 1865, pp. 157 and 172: E. Martens, Verh. zool.-bot. Ges. Wien, XVI. 1866, p. 381: A. Milne-Edwards, Nouv. Archiv. du Mus. IV. 1868, p. 72, and X. 1874, p. 55: Hilgendorf in Von Der Decken's Reisen in Ost.-Afr. III. i. 92: Brito Capello, Jorn. Sci. Nat. Lisboa, III. 1870-71, p. 133, pl. ii. fig. 8: Hoffman in Pollen and Van Dam, Faun. Madagasc. V. 2. 1874, Crustacea, p. 25 (*part*), pl. vi. figs. 39, 41, 42: Brocchi, Ann. Sci. Nat. (6) II. 1875, Art. 2, p. 101, pl. xviii. figs. 160, 161, (*male appendages*): Kossmann, Reise Roth. Meer., Crust., p. 63: Streets, Bull. U. S. Nat. Mus. VII. 1877, p. 116: Hilgendorf, MB. Ak. Berl. 1878, p. 809: Richters, in Möbius, Meeresf. Maurit. p. 157: de Man, Notes Leyden Mus. II. 1880, p. 184, and Archiv. fur Naturges. LIII. i. 1887, p. 388: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 46 (*gastric teeth*): Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 425: Muller, Verh. Ges. Basel VIII. 1886, p. 473.

Calappa tuberculosa, Guérin Méneville, Icon. R. A., Crust. pl. 12, figs. 2, 2*a*, 2*b*.

Calappa sandwichien (*Calappa tuberculata* var.) Eydoux and Souleyet Voy. 'Bonite,' Vol. I., Zool., p. 245, pl. iii., figs. 9, 10.

Length of carapace a little more than half the extreme breadth. In the anterior two-thirds the surface of the carapace is tuberculate and granular, in the posterior third it is marked with squamiform tubercles and beaded ridges: the antero-lateral borders are coarsely dentate or serrate.

Clypeiform expansions greatly developed, their breadth being equal to their length: their anterior border shows the points of four teeth, but the postero-lateral border forms a continuous curve, broken only on the under surface by three or four faint sutures.

Posterior border of the carapace beaded, unarmed.

Outer part of the pterygostomian regions densely hairy.

Front emarginate, not projecting beyond the level of the orbits, its breadth at the tip markedly less than the breadth of the orbit.

The endostomial septum extends vertically from the level of the front to the level of the mouth; its anterior border strongly convex and projecting.

Transverse wing-like expansion of the distal end of the arm with its edge four-lobed. Outer surface of palm with numerous sharp tubercles: upper surface of wrist tuberculate: anterior end of arm with some sharp granules: crest of palm crenulate, not sharply dentate.

Andamans, Nicobars, Maldives, Laccadives, Persian Gulf.

In the very *young*, the extreme length of the carapace is not much

less than three-fourths of the extreme breadth, owing not only to less development of the clypeiform expansions, but to the relative less breadth of the body.

3. *Calappa spinosissima*, Edw.

Calappa spinosissima, Milne Edwards, Hist. Nat. Crust. II. 106: A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 55: Richters, in Möbius Meeresf. Maurit, p. 157.

Calappa tuberculata (part) Hoffmann in Pollen and Van Dam, Faun. Madagasc. V. ii. Crustacea, p. 25, pl. vi. figs. 40, 43, 44.

Differs from *C. hepatica* only in the following characters:—

(1) the serrations on the antero-lateral border of the carapace, as also the teeth on the antero-lateral border of the clypeiform expansions, are in the form of sharp up-curved spines:

(2) the postero-lateral border of either clypeiform expansion has three spines where, in *C. hepatica*, there are only sutures on the under surface:

(3) some of the tubercles on the outer surface of the palm have sharp spinous points.

From a single small specimen, which is all that the Indian Museum at present possesses, it is impossible to express any opinion as to whether this species is, as Hoffmann appears to have regarded it, a variety of *C. hepatica*, or not.

4. *Calappa lophos*, (Herbst).

Cancer lophos, Herbst, Krabben, I. ii. 201, pl. xiii. fig. 77.

Calappa lophos, Fabricius, Ent. Syst. Suppl., p. 346: Bosc, Hist. Nat. Crust. I. 184: Latreille, Hist. Nat. Crust. et Ins. V. 394: Milne Edwards, Hist. Nat. Crust. II. 104: De Haan, Faun. Japon. Crust. p. 72, pl. xx. fig. 1: Heller, 'Novara' Crust. p. 69: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, and 'Challenger' Brachyura, p. 286: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 46, (*gastric teeth*): de Man, Archiv. fur Naturges. LIII. 1887, i. p. 389: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 395.

? *Calappa guerini*, Brito-Capello, Jorn. Sci. Nat. Lisb. III. 1870-71, pp. 128, 133 pl. ii. fig. 2.

The length of the carapace is not quite two-thirds the extreme breadth.

Carapace smooth, except for a few lumps anteriorly and a few scattered granules posteriorly: its antero-lateral borders beaded and finely festooned: its posterior border beaded, and bounded on either side by a tooth.

Clypeiform expansions nearly as broad (transverse measurement) as long (oblique antero-posterior measurement), and formed of about 6 large laciniated teeth.

Outer part of the pterygostomian regions densely hairy.

Front bifid, its least breadth equal to the breadth of the orbit, beyond the level of which it does not project.

Endostomial septum extending, posteriorly, from the level of the front to the level of the mouth, but deeply excised anteriorly.

Margin of the transverse wing-like expansion of the distal end of the arm four-lobed, the two anterior lobes each with a spine: upper surface of wrist and outer surface of palm nearly smooth: crest of palm deeply 6- or 7-toothed.

Andamans; the whole of the east coast of India, from the Ganges Delta to Pondicherry; Ceylon, Persian Gulf.

In the *young* the carapace is traversed longitudinally in its anterior three-fourths, by 7 or 8 lines of sharpish tubercles, and is marked in its posterior third by a pair of large ocelli, one in each epibranchial region.

From an examination of a very large series of these young I feel nearly sure that Capello's *C. guerini* is to be referred to this species.

5. *Calappa philargius* (L.)

Cancer philargius, Linn. Mus. Lud. Ulr. p. 432, and Syst. Nat. ed. xii. I. ii. 1042: Herbst, Krabben, I. ii. 203.

Cancer inconspectus, Herbst, Krabben, II. ii. 162, pl. xl. fig. 3.

Calappa cristata, Fabricius, Ent. Syst. Suppl. p. 346: Latreille, Hist. Nat. Crust. et Ins. V. 393: Milne-Edwards, Hist. Nat. Crust. II. 105, pl. xx. figs. 1, 2: Stimpson, Proc. Ac. Nat. Sci. Philad., 1858, p. 62: Ortmann, Zool. Jahrb., Syst. etc., VI., 1892, p. 565.

Calappa inconspecta, Bosc, Hist. Nat. Crust. I. 185.

Calappa philargius, De Haan, Faun. Japon. Crust. p. 71, pl. xix. fig. 1: E. Nauck, Zeits. Wiss. Zool., XXXIV. 1880, p. 46 (*gastric teeth*): de Man, Archiv. fur Naturges., LIII. 1887, i. p. 388, and Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 196: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 396.

The extreme length of the carapace is two-thirds the extreme breadth.

Differs from *C. lophos* only in the following characters:—

(1) there is a large tooth in the middle of the posterior border, and the tooth bounding that border on either side is more salient:

(2) the endostomial septum, instead of being deeply excised anteriorly, has its anterior border strongly convex and projecting.

Mergui, Andamans, Ceylon, Persian Gulf.

In the *young* the teeth of the posterior and postero-lateral borders are more prominent and less oblique; and the carapace is traversed fore and aft by 7 or 8 rows of sharp tubercles.

6. *Calappa exanthematosa*, Alcock and Anderson.

Calappa exanthematosa, Alcock and Anderson, Journal Asiatic Soc. Bengal, Vol. LXIII. pt. 2, 1894, p. 177, and Illustrations of the Zoology of the R. I. M. S. 'Investigator,' Crustacea, pl. xv. figs., 1, 1*a*.

Extreme length of carapace a little more than two-thirds the extreme breadth.

The carapace is greatly inflated, especially in the branchial regions: its surface in rather more than its anterior half is covered with large round, or oval, smooth mamillary tubercles having a red base and a shining yellow apex, and exactly resembling smallpox pustules; and is covered posteriorly with smaller round, or oval, slightly elevated patches, which exactly resemble smallpox papules. The antero-lateral borders of the carapace are quite smooth in their anterior half, and have 4 or 5 coarse serrations in their posterior half: the posterior border is beaded, and is bounded on either side by a tooth.

The clypeiform expansions are little developed, their extreme transverse dimension being less than one-third their extreme dimension in an inwardly oblique antero-posterior direction: they consist of about seven serrated teeth.

The pterygostomian regions have only a few scanty hairs.

The front is bifid, the breadth of its tip is half again that of the orbit, beyond which it does not project.

The flagellum of the antenna is nearly twice the breadth of the orbit in length.

The endostomial septum is narrow, not extending vertically to the level of the mouth, and quite plainly shows its origin out of a fold of the endostome: its anterior border is cut straight, and projects obliquely.

The wing-like expansion at the end of the arm has its edge finely serrate and 4-dentate. The upper surface of the wrist and the outer surface of the palm are more or less covered with pustules similar to those on the carapace. The palm has its crest sharply 6- or 7-dentate and its lower surface uniformly covered with beadlike granules.

The sterna corresponding to the 2nd, 3rd and 4th pairs of legs are much inflated.

Bay of Bengal, off the Madras coast, 91–112 fms.

In the *young* the tubercles on the carapace are sharper, and extend further backwards.

7. *Calappa gallus*, (Herbst.)

Cancer gallus, Herbst, Krabben, III. iii. 46, pl. lviii. fig. 1.
Calappa gallus, Milne Edwards, Hist. Nat. Crust. II. 105: De Haan, Faun.

Japon. Crust. p. 70: Dana, U. S. Expl. Exp. Crust. pt. I. p. 393: A. Milne Edwards in Maillard's l'île Réunion, Annexe F. p. 10, and Nouv. Archiv. du Mus. X. 1874, p. 55: Brito Capello, Jorn. Sci. Nat. Lisb. III. 1870-71, p. 133, pl. ii. fig. 4: F. Müller, Verh. Ges. Basel, VIII. 1886, p. 473: Miers, 'Challenger' Brachyura, p. 286: Ozorio, Jorn. Sci. Nat. Lisb., XI. 1885–87, p. 227: de Man, Arch. fur Naturges., LIII. 1887, i. p. 388, and Journ. Linn. Soc., Zool. XXII. 1888, p. 197: Ortmann, Zool. Jahrbuch., Syst., &c., VI. 1892, p. 567: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 395.

The extreme length of the carapace is nearly five-sixths the extreme breadth.

The carapace, the outer surface of the wing-like expansion of the arm, the upper surface of the wrist, and the outer surface of the palm, are covered with coarse tubercles, which become squamiform on the posterior part of the carapace.

The antero-lateral border of the carapace is crenulate, and the posterior border is finely beaded and quite unarmed.

The clypeiform expansions are well developed, their extreme transverse dimension being about two-thirds their extreme antero-posterior dimension: the free edge of each has about six strong teeth with beaded edges

The pterygostomian regions have only a few scanty hairs.

The front is emarginate, and projects well beyond the orbits, forming a laminar rostrum.

The endostomial septum extends vertically from the level of the front to the level of the mouth: its anterior border is angularly convex.

The wing-like expansion of the end of the arm is conspicuously four-lobed: the crest of the palm is 6- or 7-dentate.

Mergui, Andamans, Ceylon, Persian Gulf.

In the *young* the tubercles of the carapace and chelipeds are sharper and crisper, and the antero-lateral borders of the carapace are sharply serrate.

8. *Calappa pustulosa*, n. sp. Plate VI. fig. 1.

Carapace subcircular, the clypeiform expansions consisting of five short broad teeth, the last of which is in advance of the level of the posterior border: its surface is covered with large bullous tubercles arranged in seven parallel longitudinal rows: the antero-lateral borders are smooth in their anterior half, crenulated in their posterior half: the posterior border is bounded on either side by a faint prominence.

The pterygostomian regions have a few scanty hairs.

The front is sharply bilobed, its tip is not quite so broad as the orbit, beyond the level of which it projects.

The endostomial septum does not extend vertically from the level of the front to the level of the mouth, except at its posterior limit.

The crest at the distal end of the arm is four-lobed: the upper surface of the wrist and the outer surface of the palm have numerous bullous tubercles like those on the carapace: the crest of the palm is serrate.

The abdomen is as in *C. lophos.*

The sterna corresponding to the 2nd, 3rd and 4th legs are inflated.

Off Ganjam and Orissa Coasts, 25 fathoms.

9. *Calappa wood-masoni*, n. sp. Plate VI. fig. 2.

Very closely allied to *C. depressa*, Miers, 'Challenger' Brachyura, p. 287, pl. xxiii. fig. 2.

The extreme length of the carapace is a little greater than the extreme breadth.

Carapace depressed; its surface crisply tuberculate, except between the eyes, the tubercles becoming squamiform posteriorly: the antero-lateral borders crisply crenulate, the posterior border entire and unarmed.

The clypeiform expansions are slightly developed, and plainly consist of about 7 convex carinate teeth fused together except at the tip.

Pterygostomian region with few scanty hairs.

Rostrum sharply and deeply bilobed, each lobe being again subdivided at tip; projecting well beyond the level of the orbits, and rather broader than them.

Flagellum of antenna nearly half the length of the carapace.

Endostomial septum extending vertically from the level of the front to the level of the mouth; its free edge greatly thickened, its anterior edge sharply excised.

Crest at the distal end of the arm broadly and faintly four-partite: upper surface of wrist and outer surface of palm crisply tuberculate: crest of palm sharply serrate.

Penultimate segment of the male abdomen the shortest of all except the first.

Off south coast of Ceylon, 34 fathoms.

The above description applies to the *young*, no adults having been obtained.

MURSIA, Desmarest, Edw.

Mursia, Desmarest, Consid. Gen. Crust., p. 108, pl. 9, fig. 3.

Mursia, [Latreille, in Cuvier, Règne Animal, ed. 2, p. 39] and Milne-Edwards in Cuvier, Règne Animal, ed. 3, p. 54.

Mursia, Milne-Edwards, Hist. Nat. Crust. II. 109.
Mursia, De Haan, Faun. Japon. Crust. p. 68 and p. 125.
Mursia, Miers, Challenger Brachyura, p. 290, (*ubi synon.*).
Thealia, Lucas, Ann. Soc. Entomol. France (1) VIII. 1839, p. 577.

Carapace oval, moderately convex, rounded in front, rather suddenly contracted behind, the evenly-arched antero-lateral margins ending in a large lateral epibranchial spine.

Front with a small acuminate tip.

Orbits rather large, oval, with at least one closed but distinct fissure in the upper margin, and with two wide gaps in the lower margin, in one of which the basal joint of the antenna is lodged. Eyes large, eyestalks short and thick.

The antennules fold obliquely. The basal joint of the antennæ is not dilated.

There is no distinct epistome, but, as in *Calappa*, the endostome is prolonged into a canal, which however is but incompletely divided longitudinally, the septum being little more than a ridge anteriorly, though well developed posteriorly. As in *Calappa* the first pair of maxillipeds give off each a lamellar process to complete this efferent canal below.

The external maxillipeds do not meet across the mouth, but, as in *Calappa*, leave exposed between them the mandibles, and, in front, the plate like prolongations of the first maxillipeds.

The chelipeds are enlarged, much as in *Calappa;* but the meropodite, or "arm," instead of a transverse crest near the distal end of its outer surface, has merely a ridge with one or two spines: the palm is compressed and its upper border forms a dentate crest, but not such a high one as that of *Calappa*. As in *Calappa* the chelipeds are only asymmetrical as regards the fingers, which on one hand have on their outer aspect, near the base, a stout lobule.* The legs are large, the first two pairs being at least as long as the chelipeds.

The abdomen in the male is as broad in the proximal half as it is in the female: in the adult male it consists of five segments, the 3rd, 4th and 5th being intimately fused, the sutures even being hardly distinguishable: in both sexes the tergum of the 1st somite is almost entirely concealed, and that of the 2nd somite strongly carinate transversely.

Mursia is practically *Calappa* without the wings to the carapace, and with large strong legs: the widely fissured orbital floor, the less

* In *Mursia hawaiiensis*, Mary J. Rathbun, Proc. United States National Museum, xvi. 1893, p. 252, the chelipeds are described as very unequal.

pronounced endostomial septum, and the slender basal-antennary joint are the other important points of difference.

10. *Mursia bicristimana*, Alcock and Anderson.

Mursia bicristimana, Alcock and Anderson, Journ. Asiatic Soc. Bengal, Vol. LXIII. 1894, pt. 2, p. 179; and Ill. Zool. 'Investigator' Crust. pl. xxiv. fig. 5 (*in the press*).

The length of the carapace is about seven-ninths of the breadth immediately in front of the lateral epibranchial spine ; and the length of the epibranchial spine is from one-third (in the young) to less than one-fourth (in the adult) the length of the carapace.

The surface of the carapace is closely granular, and in addition there are *seven rows of tubercles*, one in the middle line, and three on each side radiating over the branchial regions: the antero-lateral margins are finely beaded and evenly and sharply festooned: the postero-lateral margins are without the angular bend inwards seen in M. armata: *the posterior margin is bounded on either side by a laminar denticle, not by a great projecting lobule as in* M. armata.

The outer parts of the pterygostomian and subhepatic regions are covered with a dense felt of long hairs.

The rostrum is trilobed, its breadth at the level of the lobes being about one half more than the greatest breadth of the orbit.

The transverse ridge near the distal end of the arm is very hairy, and is armed distally with two spines, the outer and larger of which is more than half the length of the lateral epibranchial spine. *This ridge is continued along the palm as a sharp longitudinal crest* (more prominent even than that of *Platymera*) which is unevenly trilobed, the proximal lobe being spiniform, the middle lobe broad and obtuse, and the distal lobe narrow and obtuse. The upper surface of the wrist, and the outer surface of the palm and fingers, are closely and sharply granular: the upper edge, or crest, of the palm is 7- serrate.

The ambulatory legs are large stout and compressed, those of the first three pairs being a little longer than the chelipeds. In these three pairs the *meropodite is lamellar, its greatest breadth being considerably more than a third its length ;* the carpus has its outer surface traversed longitudinally by three beaded carinæ, the middle one of which ends in a spine ; and the propodite is lamellar with the outer (anterior) edge subcarinate and the upper surface traversed longitudinally by two or three raised lines of fine beading.

The second abdominal tergum in both sexes is raised into a stout carina, the height of which is more than a third the transverse diameter of the tergum : this carina is three lobed, the lobes being separated only

by fissures. In the female, as in the male, the 3rd–5th terga are fused, although the lines of fusion are quite distinct in the former sex.

Colours in life salmon pink.

Off Ceylon, 142–400 fms., and 180–217 fms.

In the form of the legs, in the ornamentation of the chelipeds, and in the shape of the carapace, this species bears a strong resemblance to *Platymera*. Even in the articulation of the flagellum with the merus of the external maxillipeds the appearances are somewhat those of *Platymera*.

On the other hand the form of the endostomial channels, and of the processes of the first maxillipeds which close those channels ventrally, as well as the practical symmetry of the chelipeds, are all as in *Mursia*.

But a comparison of this species with specimens of *Mursia armata* and *Platymera gaudichaudii* leads to the belief that all three are congeneric.

The dimensions of an adult male are as follows :—

breadth of carapace 67 millim., excluding the lateral epibranchial spines;
length of carapace 47 millim.
length of first pair of ambulatory legs about 90 millim.

Cryptosoma, Brullé.

Cryptosoma, Brullé in Webb and Berthelot's Hist. Nat. des îles Canaries, Crustacés, p. 16.

Cryptosoma, Milne-Edwards, Hist. Nat. Crust., II. 110.

Cryptosoma, Miers, Challenger 'Brachyura,' p. 292.

Cycloes, De Haan, Faun. Japon. Crust., p. 68, and p. 125.

Carapace heart-shaped or subcircular.

Front rather narrow, and often emarginate.

Orbits, as in *Mursia*, large, oval, with a distinct suture or a fissure in the roof, and with two gaps in the floor, in one of which the slender basal-antennary joint is lodged. Eyes large, eyestalks short and thick.

The antennules fold obliquely.

The external maxillipeds meet sufficiently to conceal all the underlying (*i.e.*, really overlying) parts, and to completely close the buccal frame as far as the front. Concealed by the external maxillipeds there is, however, an endostomial efferent branchial channel closed by lamellar processes from the 1st pair of maxillipeds.

The antero-internal angle of the merus of the external maxillipeds is prolonged obliquely forwards to form a prominent lobule above the articulation of the palp.

The chelipeds are as in *Calappa* and *Mursia:* the meropodite, or "arm" has the same transverse ridge or crest near its distal end, externally; the palm is strongly compressed, with its upper border raised into a sharp serrated crest; and the chelipeds as a whole are symmetrical, except that on one hand the fingers have each, at the base, on their outer surface, a coarse tooth or lobule.

The legs are compressed and are of moderate size: none of them approach the chelipeds in length.

The abdomen in both sexes is much as in *Calappa*: in the male the 3rd, 4th and 5th terga are intimately fused together, and with almost complete obliteration of sutures; in the female all seven segments are perfectly distinct. In the majority of species the second abdominal tergum, in both sexes, is strongly carinate transversely, as in *Mursia*.

11. *Cryptosoma granulosum*, (De Haan).

Cycloes granulosa, De Haan, Faun. Japon. Crust. p. 71, pl. xix. fig. 3.

Cryptosoma granulosum, Miers, 'Challenger' Brachyura, p. 293: Alcock and Anderson, J. A. S. B., Vol. LXIII. 1894, pt. 2, pp. 198 and 203.

Carapace conspicuously longer than broad, its surface, like the exposed surfaces of the chelipeds, finely and very closely granular: in its anterior half there are also some small tubercles, most of which fall into seven nearly longitudinal rows, one row being in the middle line. The antero-lateral borders are very finely crenulate, and end at a tiny lateral-epibranchial denticle. The convergent postero-lateral borders, and the posterior border, are very finely and closely beaded. The outer parts of the pterygostomian and subhepatic regions are covered with a felt of fine short hairs.

The front is bidentate and projects beyond the level of the orbits: the latter occupy all the rest of the anterior border.

The antennary flagella are very short.

The transverse ridge at the distal end of the arm is granular, and is armed with three spines gradually increasing in size from within outwards: the upper surface of the wrist has several small tubercles: the outer surface of the hand has, at its base, an oblique crest, which ends acutely and is continued obliquely upwards as a line of small tubercles; a second line of tubercles runs parallel with this, obliquely across the middle of the hand: the crest of the hand is 8-dentate.

The last pair of legs has its four terminal joints distinctly lamellar.

The carina of the second abdominal tergum is in both sexes trilobed, the middle lobe being much smaller than the lateral lobes.

Andamans, depth not recorded: Maldives, 20–30 fms.

Matuta, Fabr., Edw.

Matuta, Fabricius, Ent. Syst., Suppl. p. 369.

Matuta, Milne-Edwards, Hist. Nat. Crust. II. 113.

Matuta, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1877) p. 243, and 'Challenger' Brachyura, p. 294.

Matuta, de Man, Notes Leyden Mus. III. 1881, p. 109.

Carapace somewhat depressed, usually subcircular, with the postero-lateral borders sharply convergent, and usually with a great horizontal spike at the lateral epibranchial angle, on either side.

There are usually six more or less distinct tubercles, disposed quite symmetrically, in the middle of the carapace, and there is commonly an eminence, or even an acute tubercle, in the front half of the postero-lateral border.

The front is about as wide as the orbit, and consists of three nearly equal lobes, the middle one of which projects as a laminar rostrum with the end usually bifid or emarginate.

The orbits are large and roughly reniform: in the middle of the upper border are two short sutures, placed close together; at the external angle is a wide gap communicating with a deep groove in the pterygostomian region; while at the internal angle is a fissure communicating with the antennulary fossa. The eyestalks are stout but somewhat elongate.

The antennules fold nearly longitudinally. The antennæ are almost rudimentary, and occupy a space between the basal-antennulary joint and the lower wall of the orbit.

The external maxillipeds completely cover the mouth and all the mouth-parts, up to the level of the front, the patulous efferent branchial orifice being visible only from above. In repose the palp of the external maxillipeds lies completely concealed within a deep groove in the dorsal face of the long subacute meropodite.

On removal of the external maxillipeds a deep undivided efferent canal is seen in the roof of the endostome, which groove is closed below by an elongate lamellar process of the first pair of maxillipeds.

The chelipeds are shaped on the *Calappa* plan, but are quite singular in having, on the inner face, near the crest of the palm, two raised obliquely-striated areas—one linear, the other broadly oval—which in two species at any rate, and probably in all, are used as stridulating organs. The meropodite, or "arm," has the transverse distal crest low, and only well-pronounced at the outer angle, where there is a prominent lobule. The propodite or "hand" is compressed, but not so much so as in *Calappa*, and has its upper border cristate, and its outer surface definitely sculptured. The fingers, as well as the rest of the chelipeds, are quite symmetrical.

The four ambulatory legs have the form of swimming-paddles, the two terminal joints being broadened and compressed—in the first and last pairs of legs enormously so.

The abdomen in the adult male consists of 5 segments, owing to the intimate fusion of the 3rd, 4th and 5th terga: in the female and young male all 7 terga are distinctly separate. In both sexes the first tergum is almost entirely concealed beneath the carapace.

In the adult male the *third* tergum is very strongly carinate transversely, and the second moderately so. In the female and young male both the *second* and *third* terga are strongly carinate, and if there is any inequality it is the *second* that is most prominent.

Owing partly to their great similarity, and partly to the insufficient descriptions of earlier authors, the discrimination of the species of *Matuta* has always been a matter of difficulty.*

The first species described and figured is the *Cancer lunaris* of Rumph (Amboinsche Rariteitkamer p. 11, pl. vii., fig. S. 1705), a species characterized by the possession of an entire (*i.e.*, not bifid) rostrum and of a very sharply defined tubercle near the middle of either posterior border.

This species must, I believe, be (1) the species called *M. banksii* by Leach, Miers, and subsequent authors, (2) the *M. picta* of Hess and Miers, (3) the *M. distinguenda* of Hoffmann, and (4) the *M. obtusifrons* of Miers. I think also that the *M. granulosa* of Miers and de Man is only a slightly abnormal form of Rumph's species.

Rumph's name having unfortunately been accepted for a quite different post-Linnæan species, cannot now be used; and Rumph's species must therefore bear the earliest applicable post-Linnæan name—namely *M. banksii*, Leach.

M. banksii according to Leach can be recognized by a very strong tubercle behind the lateral spine.

The second known species of *Matuta* is the *Cancer americanus* of Seba (Thesaurus III. 52, pl. xx., figs. 10, 11. 1758), of which it is impossible to say more than that it roughly represents the form of the genus *Matuta*.

Herbst (Krabben, etc., 1790–1799) described and figured two species of *Matuta*. One (Krabben, I. ii. 140, pl. vi. fig. 44), he called *C. lunaris*, and this he says is Rumph's species, quoting Rumph's Latin and vernacular names: the other (I. ii. 143) he called *C. victor* of Fabricius. Subsequently, however (III. ii. 43) he renamed *C. victor C. lunaris*, figured it on pl. xlviii. fig. 6, and stated that his *C. victor* and *C. lunaris* are the same species.

Herbst's two figures—pl. vi. fig. 44 and pl. xlviii. fig. 6—are so different, however, that doubts must still remain as to whether they both really do refer to the same species, and it does not seem to me that Hilgendorf's observations, to be presently referred to, clear these doubts up. I believe myself that Herbst's plate vi. fig. 44 might still be regarded, as Herbst at first seems to have regarded it, as representing Rumph's *Cancer lunaris*.

Fabricius who (Entomol. Syst., Suppl. p. 369, 1798) instituted the genus *Matuta*, included in it two species—*M. victor* and *M. planipes*. We know, from Hilgendorf's paper to be presently considered, to what species of modern authors these refer.

* Unfortunately I have not been able to see Latreille's article on the genus Matuta in the *Encyclopédie Méthodique*, Vol. X.

Leach (Zool. Miscellany III. pp. 12-14, 1817), gave brief diagnoses of four species of *Matuta*. One of these—*M. banksii*—I believe to apply to Rumph's *Cancer lunaris*.

A second—*M. lesueurii*—is referred by Miers, and I think with justice, to the *M. victor* of Fabricius.

A third—*M. peronii*—is also, and I think rightly, referred by Miers to *M. victor*, Fabr.

The fourth—*M. lunaris*—is regarded by Miers, whose paper will be considered in the sequel, as applicable to *M. picta* of Hess, a species characterized by having a simple rostrum and a tubercle in the postero-lateral border. Now Leach's figure shows a distinctly bilobed rostrum, and has no tubercle on the postero-lateral border, so that I do not see how the name *M. picta* can apply to it. Leach's *M. lunaris* seems to me rather to agree with the species described by Henderson as *M. miersii*.

To sum up, it seems to me that three species were known to Leach, namely *M. banksii*, Leach, (Rumph's species), *M. victor* Fabr. and perhaps the species now known as *M. miersii*, Henders.

The great naturalist Milne-Edwards only admitted two species of *Matuta*, namely *M. lunaris* and *M. victor*, and it is only because I have been able to examine over 400 specimens from all parts of the Indian coasts, that I venture to disagree from him.

I can reconcile his description of *M. lunaris* with the *M. lunaris* of Leach and with Guérin's figure of *M. peronii* (not Leach's); but on the strength of Hilgendorf's statements I do not see how it can be reconciled with Herbst's *Cancer lunaris*. Milne-Edwards italicizes the fact that the carpus of the penultimate pair of legs is *bicarinate*: now the only species known to me that agrees with his description in other respects, and has also the carpus of the penultimate legs full and indistinctly bicarinate, is Henderson's *M. miersii*.

The *M. victor* of Milne-Edwards seems to be Fabricius' species, although I do not think that the whole of the synonomy can be accepted.

Miers' classical attempt (Trans. Linn. Soc. Zool. (2) I. 1875-79 [1877] p. 243) to simplify the confusion existing in this group, although forming a careful critical and extremely valuable paper, yet fails for the reason that the character selected by Miers for the primary subdivision of the genus—namely the sculpture of the hands and fingers—varies not only according to sex (as Miers indeed fully recognized), but also according to age.

In Miers' system the adult males of *M. victor*, Fabr. and of *M. lunaris* Hbst. Hilgendorf, belong to one section of the genus, and the young males to the other section.

One has, of course, to be very careful in deciding that any given small specimen of *Matuta* corresponds with the young of any given large specimen; but when one finds, for example, that a small male individual, taken on the same spot with a large male and female, exactly resembles the adults in all important characters, and differs from the adult male, and agrees with the adult female, just in those very characters where the adult female differs from the adult male; when, therefore, such a young one can be confused with no other known species; and when moreover these agreements and differences are found to have a general correspondence throughout the whole genus; then one can with some confidence assign that young individual to its place.

One of the most constant differences, throughout the genus, between the adult

male on the one hand, and the female and young male on the other hand, is found in the second and third abdominal terga: in all adult males the third abdominal tergum is very strongly carinated transversely, and the second is carinated also, but not nearly so strongly: in all adult females both the second and the third terga are either equally strongly carinate, or, if one is more prominent than the other, it is the second.

The other differences between the sexes are those (emphasized by Miers) that occur in the sculpture of the hand and fingers; and these differences also apply between the adult male and the young male, which Miers does not appear to have taken into consideration.

The nine species separated by Miers can, in my opinion, be reduced to three, namely, *M. banksii* Leach (Rumph's species), *M. victor*, Fabr., and *M. lunaris* Hbst. Hilgendorf.

The next paper to be referred to is that by Hilgendorf (Monatsber. Ak. Berl. 1878 [1879] p. 810), which is a most authoritative contribution, since the writer had been able to examine Fabricius' types of *M. victor* and *M. planipes*, and apparently also Herbst's specimens. Dr. Hilgendorf states definitely (1) that *M. victor* Fabr. is the species carefully described and figured as *M. victrix* by Miers (*loc. cit.*); (2) that the species figured by Herbst. *on pl. xlviii. fig.* 6 is the unequivocally recognizable *M. rubro-lineata* of Miers (*loc. cit.*); and (3) that the *M. planipes* of Fabricius is *M. lunaris* of Herbst. It is most unfortunate that Dr. Hilgendorf does not tell us whether *both* of Herbst's figures refer to the same species, or not. We now know, without any ambiguity, what Herbst's pl. xlviii. fig. 6 is; but we are still in doubt as to the meaning of pl. vi. fig. 44.

The last reference necessary is to de Man's paper (Notes Leyden Mus. III. 1881, p. 109), on the species of *Matuta* in the Leyden Museum, a paper that embodies the results of an examination of no less than 270 specimens. With most of Dr. de Man's synonomy I entirely agree, although I am unable to follow him in the acceptance of *M. granulosa*, *M. maculata* and *M. picta* as distinct species.

Dr. de Man rightly recognizes the value of the sculpture of the hand and fingers in the descrimination of the species; but, equally with Mr. Miers, he takes no due notice of the fact that this character varies with age, at any rate in the male sex. He considers that the development of the tubercles on the surface and lateral margins of the carapace furnishes a character of only secondary importance, in which opinion I cannot quite agree with him if he includes the tubercle on the postero-lateral border.

It remains only to refer to the opinions of those who, like M. A. Milne-Edwards and Dr. Ortmann, regard all the forms of *Matuta* as varieties of a single species. This view would seem to imply that the characters by which the species are usually recognized are variable,—either indefinitely so, or in response to some local peculiarities of the environment. Of this I can find no evidence.

Certain of the characters that I have used in separating the species in the Indian Museum Collection are, as far as an examination of over 400 specimens goes, perfectly well defined, whether in the young or in the adult, and whether from the same locality or not.

The characters of the first importance in the separation of the species are those emphasized by Milne Edwards, namely (1) the form of the carpus of the penultimate pair of legs—whether full and

"bicarinate," or compressed and unicarinate, and (2) the extent of the raised postero-lateral border—whether stopping short of the great lateral spine, or prolonged into the border of that spine. With regard to the first of these characters, it may be remarked that the distinction drawn is between a distinctly compressed carpus, and a distinctly inflated carpus. With regard to the second, the distinction drawn is between a sharply-raised border that (in any position of the carapace and in any light) can be plainly seen to form a considerable part of the hinder border of the great lateral spine, and a border that stops at the base of the spine or even further behind. The sculpture of the lower part of the outer surface of the hand is also very definite in all the species, and—if age and sex be taken into due consideration—the sculpture of the median ridge of the hand and of the dactylus. The presence or absence of a tubercle on the postero-lateral border is also of importance.

Key to the species of Matuta.

[I. Carapace pentagonal, lateral epibranchial spine rudimentary ... ... *M. inermis.**]

II. Carapace more subcircular than pentagonal, lateral epibranchial spine greatly developed (*Indian species*) :—

1. Front just equal to the orbit in width, rostrum simple or faintly emarginate : a sharply defined acute tubercle near the middle of the posterolateral border *M. banksii.*

2. Front distinctly wider than the orbit, rostrum distinctly bilobed : postero-lateral border with or without an obscurely defined eminence near its middle :—

i. Postero-lateral border elevated throughout, forming a considerable part of the hinder border of the great lateral spine, and without any trace of a tubercle or eminence : lower surface of hand very rough in the adults of both sexes ... ... *M. miersii.*

* *M. inermis*, Miers, Zoology H. M. S. 'Alert,' p. 256, pl. xxvi. fig. C. Known only from the Melanesian part of the Indo-Pacific area.

ii. Postero-lateral border elevated posteriorly, gradually subsiding at or behind the great lateral spine, and with an obscurely defined eminence: lower surface of hand quite smooth in the adult male, a little rough in the female and young:—

a. A distinct spine at the angle of the hand where it comes in contact with the external angle of the arm: carapace covered with minute red dots ... ... *M. victor.*

b. Only a tubercle at the angle of the hand where it touches the external angle of the arm: carapace covered with spots, rings, and vermicular lines... ... ... *M. lunaris.* (*M. planipes.*)

12. *Matuta banksii*, Leach.

Cancer lunaris, Rumph, Amboinsche Rariteitkamer, I. p. 11, pl. vii. fig. S. (1705).

?? Cancer lunaris, Herbst, Krabben I. ii. 140, pl. vi. fig. 4 (*nec* III. i. 43, pl. xlviii. fig. 6).

?? Matuta victor, Bosc, Hist. Nat. Crust. I. 225, pl. iv. fig. 3, (*nec* Fabr.)

Matuta banksii, Leach, Zool. Miscell III. p. 14. (1817).

Matuta victor, Desmarest, Consid. Crust. p. 101, pl. vii. fig. 2 (*nec* Fabr.)

Matuta victor var. *quinta* et *sexta*, De Haan, Faun. Japon. Crust. p. 128.

Matuta banksii, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876) p. 245, pl. xl. figs. 1, 2, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 115, and Archiv. fur Naturgesch. LIII. 1887, i. p. 389, and in Weber's Zool. Ergeb. Niederl. Ost.-Ind. II. 1892, p. 351: A. O. Walker, Journ. Linn. Soc. Zool. XX. 1890, p. 111: Zehntner. Rev. Suisse de Zool. II. 1894, p. 183, pl. viii. fig. 15.

Matuta picta, Hess, Arch. für Naturges. XXXI. i. 1865, pp. 158, 172, pl. vi. fig. 13: Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79, (1876) p. 246, pl. xl. figs. 5–7, and 'Challenger' Brachyura, p. 295: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 46 (*gastric teeth*): de Man, Notes Leyden Mus. III. 1881, p. 118, and Zool. Jahrbucher, II. 1887, p. 703: Haswell, Cat. Austr. Crust. p. 135.

Matuta distinguenda, Hoffmann in Pollen and Van Dam's Fauna Madagasc., Crust. p. 27, pl. vi. figs. 49–52, pl. vii. figs. 53–57 (1874): Lenz and Richters, Abh. Senk. Ges. XII. 1881, p. 425.

Matuta obtusifrons, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876), p. 247, pl. xl. figs. 8 and 9, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 316.

? Matuta granulosa, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876) p. 245, pl. xxxix. figs. 8, 9, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 114: Haswell, Cat. Austral. Crust. p. 134.

Matuta victor, varr. 5 and 6, and ? 4, Ortmann, Zool. Jahrbucher, Syst., &c., VI., 1891-92, pp. 572, 573.

Carapace coarsely granular in the epibranchial, post-gastric and cardiac regions. All six tubercles are almost always very distinct, both in the young and adult.

The antero-lateral borders are crenulate, the last three crenulations forming three large blunt teeth. The posterior and postero-lateral borders form a continuous granular slightly-elevated ridge, which stops at a sharply-defined tubercle, or tooth, situated considerably in rear of the lateral epibranchial spine. The length of this lateral spine (measured along its front border) is always less than one-fourth the breadth of the carapace.

Front just equal in width to the orbit: rostrum either entire, or faintly emarginate.

Hand with the upper border, or crest, trilobed, and the lower border dentate as far as the base of the immobile finger. Below the crest are two obliquely-longitudinal rows of tubercles, the lower somewhat broken and irregular. Below these, the hand is traversed longitudinally, as far as the finger-cleft, by a row of 5 teeth, of which the 2nd (counting from the proximal end) is enlarged and acute, and the 4th is also somewhat enlarged and acute, but less so in the adult male than in the female and young male. The surface of the hand, below the ridge, is roughened, and is traversed—from the angle where the hand touches the arm, to the immobile finger—by a row of molariform tubercles, which is continued to the tip of the immobile finger as a ridge and furrow: the first of these tubercles, at the angle where the hand touches the arm, is enlarged and acute. The dactylus in the female and young male is convex and smooth: in the adult male it is longitudinally traversed by a sharp ridge, which becomes milled at the distal end.

The carpus of the penultimate pair of legs is full and even inflated, and shows more or less distinct traces of a second dorsal longitudinal carina.

Colour in spirit bright yellow, with a fine close discontinuous reticulum of red markings, which give to the whole, when viewed from a distance, a rich chestnut-brown appearance. The legs are also of the

same bright yellow colour, with copious chestnut-brown markings. Under surface light yellow.

In the Indian Seas only at the Andamans and Nicobars.

The branchial cavity in this species is often occupied by a Bopyrid.

I have examined 63 specimens in the Indian Museum collection, comprising 19 adult males, 28 females, and 16 young males.

13. * *Matuta victor*, Fabr., Hilgendorf.†

Cancer victor, Fabricius, Ent. Syst. II. 449 (*fide* Hilgendorf). 1793.

Matuta victor, Fabricius, Ent. Syst. Suppl., p. 369 (*fide* Hilgendorf).

Matuta victor, Milne Edwards in Cuvier, Règne Animal, Crust. pl. vii. and Hist. Nat. Crust. II. 115.

Matuta victor, var. *prima* et *secunda*, De Haan, Faun. Japon. Crust. p. 127.

Matuta victor, Hilgendorf in Von der Decken's Reisen in Ost.-Afr. III. i. Crust. p. 93, pl. iii. fig. 2: Hoffmann in Pollen and Van Dam's Faun. Madagasc., Crust., p. 27, pl. vi. figs. 45–48: Hilgendorf, mb. ak. Berl. 1878, p. 810.

Matuta victrix, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876) p. 243, pl. xxxix. figs. 1–3, and Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, and Zool. H. M. S. 'Alert' pp. 185, 256, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 110, and Archiv für Naturges. LIII. 1887, i. p. 389: Haswell, Cat. Austral. Crust. p. 133: J. R. Henderson, Madras Journ. Lit. Sci. 1886-87, p. 65, and Trans. Linn. Soc. Zool. (2) V. 1893, p. 396: Ortmann, Zool. Jahrbucher, Syst. etc. VI. 1891-92, varr. 1 and 2 pp. 571-572.

Matuta victrix var. *crebrepunctata*, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876), p. 244, pl. xxxix. fig. 4, and 'Challenger' Brachyura, p. 295: de Man in Weber's Zool. Ergeb. Niederl. Ost.-Ind. II. p. 351.

Matuta peronii, Leach (*nec* Guérin), Zool. Miscell. III. p. 13, pl. 127, figs. 1, 2.

Matuta lesueurii, Leach, Zool. Miscell. III. p. 14.

Matuta maculata, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876) p. 246, pl. xl. figs. 3, 4, and 'Challenger' Brachyura, p. 295: de Man, Notes Leyden Mus. III. 1881, p. 116.

Carapace finely granular in the epibranchial, post-gastric and cardiac regions. The two anterior tubercles are obsolescent; the other four are visible, but are not conspicuous in the adult.

The antero-lateral borders are crenulate, two—sometimes three—of the crenulations being somewhat enlarged, but never forming stout teeth. The posterior and postero-lateral borders form a continuous finely-beaded slightly-elevated ridge, which ends on a faintly-marked elevation, situated considerably in rear of the lateral spine. The length of the

* The specific name *victor* is here regarded as a noun substantive in apposition to *Matuta*, just as in the name *Felis leo*, the masculine noun *leo* is in apposition to the feminine noun *felis*. It seems unnecessary to change the old established name *M. victor* for a name based on the personal claims of the goddess *Matuta*.

† No references are given, except such as appear to be unequivocally applicable to *M. victor* as re-defined by Miers and confirmed by Hilgendorf.

lateral spine is always very much more than one-fourth—often more than one-third—the breadth of the carapace.

The front is wider than the orbit: the rostrum is sharply bilobed.

Hand with the crest trilobed—the proximal lobe broad, the others acute, and with the lower border dentate (female and young male) or bluntly crenulate (adult male) as far as the base of the immobile finger. Below the crest, on the upper aspect of the hand, are two obliquely-longitudinal rows of tubercles, the lower of which is somewhat broken and irregular. Below these the hand is traversed longitudinally by a ridge, which varies according to age and sex: in the adult male it is strongly salient and is continued nearly to the tip of the immobile finger, and has at its proximal end a tubercle followed by a spine: in the female and younger male it becomes nearly obsolete at the base of the immobile finger, and is broken up into five lobes, of which the second (counting from the proximal end) and the fourth are spines—the second being very large. The surface of the hand below this ridge is smooth in the adult male, except for a strongish spine at the angle where the hand touches the arm; but in the female and younger male it is traversed just above the lower border by a raised but broken ridge, which is most distinct on the immobile finger. The dactylus varies also according to sex and age: in the adult male its external surface is traversed from base to tip by a strongly-milled ridge: in the adult female and youngest males there is little trace of ridge, and none of milling: and the ridge and milling gradually appear in the male with growth, often showing on one hand before the other.

The carpus of the penultimate pair of legs is compressed, and is surmounted dorsally by a single carina.

Colours of carapace, in spirit, dull yellowish-brown to dull olive-green, with a multitude of speckles.

Indian coasts—Penang, Tavoy, Arakan, Andamans, Ganges Delta, Máhánaddi Delta, Madras, Ceylon, Malabar coast, Karáchi.

I have examined 41 adult males, 120 females, and 49 young males in the Indian Museum collection.

This grows to a larger size than any other species of *Matuta*.

14. *Matuta lunaris* (Herbst) Hilgendorf.[1]

? Cancer lunaris, Herbst, Krabben I, ii. 140, pl. vi. fig. 44, (1790).

Matuta planipes, Fabricius, Ent. Syst. Suppl. p. 369 (*fide* Hilgendorf), 1798.

Matuta lunaris, Herbst (*nec* Rumph) Krabben, III. i. 43, pl. xlviii. fig. 6 (*fide* Hilgendorf), 1799.

[1] No references are given except such as appear to be unequivocally applicable to the *M. lunaris* of Hilgendorf.

Matuta appendiculata, Bosc, Hist. Nat. Crust. I. 225.

Matuta victor, var. *tertia* et *quarta*, DeHaan, Faun. Japon. Crust. pp. 127 and 128.

Matuta lunaris, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876) p. 247, pl. xl. figs. 10-11 (♀ and young ♂), and 'Challenger' Brachyura, p. 295: Hilgendorf MB. Ak. Berl. 1878, p. 810: de Man, Notes Leyden Museum, III. 1881, p. 112: Henderson, Madras Journ. Lit. Sci. 1886-87, p. 66, fig. 6, and Trans. Linn. Soc. Zool. (2) V. 1893, p. 396.

Matuta rubrolineata, Miers, Trans. Linn. Soc. Zool. (2) I. 1875–79 (1876), p. 244, pl. xxxix. figs. 5, 6.

Matuta lineifera, Miers, *op. cit.*, p. 245, pl. xxxix. fig. 7: Haswell Cat. Austral. Crust. p. 134.

Matuta circulifera, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 315, pl. xiv. fig. 5, and Challenger Brachyura, p. 295.

Matuta laevidactyla, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 316 (footnote), and 'Challenger' Brachyura, p. 296 (♀ and young ♂).

Matuta victor, var. 3, Ortmann, Zool. Jahrbucher, Syst. &c. VI. 1891–92, p. 572.

Except in colour this species resembles *Matuta victor* very closely, differing only in the following characters:—

(1) the carapace is almost smooth, and the tubercles in the adult, but not in the young, are *all* indistinct:

(2) instead of a spine at the angle where the hand comes in contact with the distal lobule of the arm, there is only a tubercle, or a pair of tubercles:

(3) the fourth lobe of the median longitudinal ridge on the outer surface of the hand is not enlarged or acute: so that, in both sexes, and at all ages, there is only one large spine on the outer surface of the hand. Apart from this, exactly the same sexual and growth-differences occur in the hand as in *M. victor*:

(4) the colour of the carapace, in spirit, is bright yellow with vermicular red lines, which usually form spots or incomplete rings on the anterior half of the carapace and narrow longitudinal loops posteriorly.

I have heard this species stridulate.

Indian coasts—Mergui, Andamans, Burma, Sunderbunds and Gangetic Delta, Máhánaddi Delta, Madras, Bombay, Karáchi.

In the Indian Museum collection are 5 adult males, 55 females (many ovigerous), and fifteen young males.

The question of uniting this species with *M. victor*, as a variety, has to be carefully considered. After examining 210 specimens of *M. victor* and 75 of *M. lunaris* I find that the differences between them hold good irrespective of age or sex, and I would therefore regard the two species as perfectly distinct. I acquiesce in the name *M. lunaris* only on the supposition that Hilgendorf's remarks apply to *both* of Herbst's figures. If they do not apply to Herbst's pl. vi. fig. 44, then the Fabrician name *M. planipes* would have the priority.

15. *Matuta miersii*, Henderson.

? *Matuta peronii*, Guérin Méneville, Icon. Règne Animal, pl. i. fig. 1 (*nec* Leach).

?? *Matuta lunaris*, Leach, Zool. Miscell. III. p. 13, pl. 127, figs. 3–5.

? *Matuta lunaris*, Milne-Edwards, Hist. Nat. Crust. II. 114 (*nec* Rumph, *nec* Herbst).

Matuta miersii, Henderson, Madras Journ. Lit. Sci. 1886–87, p. 66, figs. 1–4, and Trans. Linn. Soc. Zool. (2) V. 1893, p. 396.

Carapace granular upon the eminences that support the tubercles, and towards the lateral epibranchial spines. All six tubercles of the carapace almost always distinct, both in the young and adult.

The antero-lateral borders are crenulate, the last three crenulations forming three large blunt teeth. The posterior and postero-lateral borders form a continuous, beaded, strongly-elevated ridge, which runs about half way along the edge of the lateral epibranchial spine and has in its course no trace of a tubercle or eminence. The length of the lateral spine is always, even in the young, less — often much less — than one-fourth the breadth of the carapace.

The front is wider than the orbit : the rostrum is distinctly bilobed.

Hand with the upper-border trilobed,—the lobes being almost always equal and acute, and with the lower border dentate, in both sexes and at all ages, as far as the base of the immobile finger. Below the crest, on the upper aspect of the hand, are two obliquely longitudinal, regular, unbroken rows of close-set teeth. Below these the hand is traversed longitudinally, as far as the finger-cleft, by a row of 5 teeth, the second of which (counting from the proximal end) is enlarged and acute. The surface of the hand below this ridge, as well as the surface of the immobile finger, is roughened, and is traversed longitudinally, at least as far as the middle of the finger, by a row of molariform tubercles, which row is sometimes incompletely double ; but none of the tubercles are acute.

The characteristic sculpture of the hand is the same in the young and adult, in both sexes.

The carpus of the penultimate pair of legs is full, not compressed, and shows more or less distinct traces of a second dorsal carina.

Colour of carapace in spirit : olive yellow with red dots which are arranged in broadish vermicular lines and rings.

This is the smallest of all the species of *Matuta :* the largest male in the collection of the Indian Museum has a carapace-breadth of only 29 millim., and the largest ovigerous female a carapace-breadth of only 20 millim., although there is a single female — non-ovigerous — as large as the largest male.

It can be at once distinguished from *M. banksii* — which it most nearly resembles — by the complete absence of a tubercle on the postero-

lateral border; and by this border being elegantly beaded, raised in very strong relief, and continued far along the edge of the lateral spine.

In the Indian Seas this species has only been found on the Madras coast.

Although I have frequently dredged it, I have never done so in less than nine fathoms. I have on more than one occasion heard it make a musical noise audible at several yards distance.

As Henderson has remarked, a *Sacculina* is often found parasitic on the male.

In the Museum collection are 14 adult males, 40 females, and 15 young males.

Family LEUCOSIIDÆ.

Leucosiens, Milne-Edwards, Hist. Nat. Crust. II. 118.
Leucosidea, De Haan, Faun. Japon. Crust. p. 129.
Leucosiidæ, Dana, U. S. Expl. Exp. Crust. pt. I. p. 390.
Leucosiadæ, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 277.
Leucosiidæ, Miers, 'Challenger' Brachyura, p. 297.

Carapace circular or oval or polygonal. Eyes and orbits very small: front narrow but many times wider than the orbit. The antennules fold more or less obliquely. The antennæ are small, sometimes obsolete. The external maxillipeds completely close the buccal cavern, except that very commonly there is a crevice in front: their palp or flagellum springs from a groove in their dorsad surface near the inner edge, and is completely concealed when the maxillipeds are in repose: the exognath is broad, sometimes remarkably broad.

The afferent branchial channels occupy the sides of the endostome on either side of the deep median endostomial groove which, as in the *Calappidæ*, serves as an efferent branchial channel. The afferent channels are covered in by the exognaths of the external maxillipeds; the efferent channel is covered in immediately, as in the *Calappidæ*, by a pair of lamellar processes from the first maxillipeds.

The chelipeds are symmetrical and have no remarkable peculiarity of form.

The abdominal terga are very rarely distinctly separate: commonly in both sexes the 3rd–6th are intimately fused with obliteration of sutures, sometimes however the 6th also is independent, and in a few forms the sutures are not obliterated.

The vasa deferentia emerge through the 5th thoracic sternum on either side, near the bases of the 5th legs.

The *Leucosiidæ* are such a natural group, and the various forms of which it is composed show so many intergradations, that any attempt to split it up into "sub-families" must be received with caution.

Among the genera known to me by autopsy, however, two extremes of form are plainly recognizable, and I propose to use these two extremes as the bases of two natural alliances or sub-families.

The first alliance is typified by *Leucosia* and *Philyra*, the second by *Ilia* and *Iphiculus*.

In *Leucosia* and *Philyra* the merus of the external maxillipeds is as long as the ischium measured along the inner border; the fingers are stout and compressed, taper gradually from a broad base, and are usually shorter than the hand; the hand is stout, compressed, and if anything a little broader at its distal end than at its base; and when the specimen is laid face downwards on the table, with the chelipeds resting on the table in a semi-flexed position, the fingers open and close in a horizontal plane.

In *Ilia* and *Iphiculus*, on the other hand, the merus of the external maxillipeds is only half the length of the ischium measured along the inner border; the fingers are slender and of almost the same diameter from the base to near the hook-like tip, and are very much longer than the hand; the hand is either subglobular, or tapering-cylindrical with a swollen base; and when the specimen is placed in the position above described, the fingers open and close in either a vertical or oblique plane, and in *Iphiculus* the dactylus can, without any breakage or unnatural dislocation of parts, be moved through an arc of about 120°.

Speaking only of the genera known to me by autopsy, the following, though they differ a good deal from *Leucosia* in the characters under consideration, do not differ nearly so much as they do from *Ilia*:—*Pseudophilyra*, *Myra*, *Parilia*, *Randallia*, *Ebalia*, *Nursia*, *Merocryptus*, *Onychomorpha*. *Tlos* and *Oreophorus* also, although their fingers move in a nearly vertical plane, yet in other respects show no close affinities with the *Ilia* type, but rather, through *Nursia*, with the *Leucosia* type; and *Actæomorpha* goes with *Oreophorus*.

On the other hand, the following Indian genera belong to the *Ilia* alliance:—*Myrodes*, *Iphiculus*, *Nursilia*, *Arcania*. *Ixa* also, although its fingers are much shorter than the hand, clearly in other respects belongs to this alliance.

I would define these two subfamilies as follows:—

1. Subfamily *Leucosiinæ*. Merus of external maxillipeds more, often much more, than half the length of the ischium measured along the inner border: fingers stout, gradually narrowing from base to tip, seldom much longer, commonly shorter, and often very much shorter than the hand, either opening in a horizontal plane or if in a vertical plane then the immobile finger is markedly more massive than the dactylus, the tip of the dactylus hardly ever movable through an arc

of over 60°: hands stout, generally longer than broad, and compressed, hardly ever broader at the base than at the distal end—when short broad and swollen (as often occurs in the Oreophoroid alliance) then the immobile finger is markedly more massive than the dactylus.

2. Subfamily *Iliinæ*. Merus of external maxillipeds half or less than half the length of the ischium measured along the inner border: fingers slender, almost of the same diameter from base to near tip, either very much longer than the hand, or if shorter than the hand then of filiform slenderness; either opening and closing in a vertical plane, or if in a nearly horizontal plane then the tip of the dactylus is movable through an arc of about 120°: hands either short swollen and subglobular, or tapering-cylindrical with a swollen base, always much broader at the base than at the point of origin of the fingers.

The following is a list of the genera of Leucosoid Crabs, so far as known to me, arranged in accordance with the classification here proposed. Indian genera are printed in Roman type, and all genera known to me by autopsy are marked with an asterisk:—

Family **Leucosiidæ.**

Sub-family I. *Leucosiinæ.*

Alliance I. Oreophoroida.

* Actæomorpha.

? *Carcinaspis*, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161.

Cryptocnemus, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161.

* Heteronucia, *n. gen.*

* *Merocryptus*, A. Milne-Edwards, Journ. Mus. Godeff. I. iv. p. 84 (260). 1873. [Transition towards *Nursia*].

* Oreophorus.

Spelæophorus, A. Milne-Edwards, Ann. Soc. Ent. Franc. (4) V. 1865, p. 148.

* Tlos.

Uhlias, Stimpson, Ann. Lyc. Nat. Hist., New York, X. 1874, p. 117.

Alliance II. Nursioida.

* Ebalia.

Lithadia, Bell, Trans. Linn. Soc. XXI. 1855, p. 305.

* Nursia.

Phlyxia, Bell, Trans. Linn. Soc. XXI. 1855, p. 303.

[*Bellidilia*, Kinahan, Journ. Roy. Dub. Soc. I. 1858, p. 128: regarded by Miers, 'Challenger' Brachyura, as synonomous with (*Phlyxia* and) *Ebalia*.]

ALLIANCE III. NUCIOIDA.

* Nucia.
* Parilia.
* Randallia.

ALLIANCE IV. MYROIDA.

Leucosilia, Bell, Trans. Linn. Soc. XXI. 1855, p. 295.
* Myra (=*Myropsis*, Stimpson).
Persephona, Leach, Zool. Miscell. III. 22 (1817) [=*Guaia*, Milne-Edwards, vide Bell, Trans. Linn. Soc. XXI. 1855, p. 292.

ALLIANCE V. LEUCOSIOIDA.

* Leucosia.
* Onychomorpha (perhaps the only known representative of a distinct alliance).
* Philyra.
* Pseudophilyra.

Sub-family II. *Iliinæ.*

ALLIANCE I. MYRODOIDA.

Callidactylus, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 157.
* Myrodes.

ALLIANCE II. IPHICULOIDA.

* Iphiculus.
* Pariphiculus, *n. gen.*

ALLIANCE III. NURSILIOIDA.

* Heterolithadia.
* Nursilia.

ALLIANCE IV. ILIOIDA.

* Arcania (=Iphis, Leach).
* *Ilia*, Leach, Zool. Miscell. III. 19: Milne-Edwards, Hist. Nat. Crust. II. 123.
Iliacantha, Stimpson, Bull. Mus. Comp. Zool. II. 1870-71, p. 155: Miers 'Challenger' Brachyura, p. 301.
* Ixa.

I. *Key to the Indian genera of the sub-family* Leucosiinæ.

I. Carapace convex or subglobular; subcircular, oval, or hexagonal in outline; its surface may sometimes be more or less covered with bead-like or vesiculous granules, but it is generally quite smooth and often polished to the naked eye; the hepatic regions may sometimes form independent convexities, and the intestinal region may sometimes be delimited by a groove or by creases, but as a rule the regions are merged in the general convexity of the carapace. The eyes are very small; and the orbits are complete—the edge of the roof being not, or little, emarginate, and the outer wall, though marked by closed sutures, not being fissured: there is little or no space between the edge of the floor of the orbit and the free edge of the buccal cavern—the two practically coinciding: antennæ distinct:—

1. Chelipeds massive: posterior margin of carapace smooth, although sometimes, especially in the young, its extreme ends may be dentiform: intestinal region never tumid and acuminate: merus of external maxillipeds nearly as long as, or sometimes even longer than, the ischium measured along the inner border:—

   i. Front narrow, prominent, forming a distinct snout projecting beyond the subhepatic or pterygostomian regions which are never puffed out: buccal cavern elongate: the exopodite of external maxillipeds narrow and elongate, with the outer margin straight:—

      a. Either a circumscribed cavity or a deep depression in the ventrad surface of the carapace above the base of the chelipeds ..... LEUCOSIA.

      b. No cavity in the carapace above the base of the chelipeds ..... PSEUDOPHILYRA.

   ii. Front broad and remarkably truncated, the whole or the greater part of the edge of the buccal cavern being seen beyond it in a dorsal view: buccal cavern broad: exopodite of external maxillipeds broad (often remarkably expanded), its outer and anterior borders forming a continuous nearly semicircular curve ..... PHILYRA.

2. Chelipeds only moderately stout, or even rather slender: three spines or long petaloid processes on the posterior border, the middle one of which belongs to the tumid intestinal region: merus of external maxillipeds not quite two-thirds the length of the ischium measured along the inner border: pterygostomian regions always puffed out beyond the level of the true antero-lateral margin of the carapace ..... MYRA.

II. Carapace strongly convex, or globular; circular or oval in outline, the regions usually, but not always, defined by distinct grooves: orbits rather incomplete, the roof being markedly emarginate, and the outer wall being often cleft by fissures (which are sometimes quite-closed sutures): *a space of remarkable depth between the edge of the lower wall of the orbit and the free edge of the buccal cavern:* posterior margin of carapace most commonly, but not always, armed with spines or tubercles: front truncated, narrow, almost always sunk behind the level of the edge of the buccal frame: *pterygostomian regions remarkably puffed out, often convex beyond the front:* merus of external maxillipeds not much shorter than the ischium measured along the inner border: antennæ very distinct:—

1. Buccal cavern transversely oblong, much broader than long, owing to the enormous width of the afferent branchial canal and of the exognath, the latter foliaceous with the outer and anterior borders forming a continuous semicircular curve: carapace ovoidal, finely scabrous: chelipeds slender—in the adult male more than four times the length of the carapace..... PARILIA.

2. Buccal cavern triangular, exognath not expanded: surface of carapace pustulous or densely vesiculous (if smooth to the naked eye the vesiculous appearance can be detected under a lens):—

   i. Carapace almost circular and globular: legs slender: chelipeds from once and a half to twice and a half the length of the carapace..... RANDALLIA.

   ii. Carapace transversely oval, manifestly broader than long, its lateral margins coarsely spinate: legs remarkably stout: chelipeds very short and stout ..... NUCIA.

III. Carapace consisting of two parts namely (1) a low convex subcircular perfectly smooth crown, formed by the carapace proper, and (2) a thin broad unbroken brim formed by the front and the confluent lateral and posterior margins: merus of external maxillipeds considerably longer than the ischium: eyes and orbits as in I: antennæ obsolete..... ONYCHOMORPHA.

IV. Carapace very rarely approaching a subcircular or ovoidal shape, commonly broad and polygonal; its surface always broken, nodular, tuberculous, wrinkled, or eroded; most commonly the regions are well delimited by grooves or by inequalities of level: almost always a distinct space between the edge of the floor of the orbit and the free edge of the buccal cavern: antennæ often indistinct, sometimes obsolete:—

1. Edge of roof of orbit markedly emarginate, so that the retracted eye is a good deal exposed to dorsal view: antennulary fossæ in open communication with orbits: space between floor of orbit and free edge of buccal cavern rather narrow: fingers opening in a horizontal plane, and of normal shape: antennæ minute, but distinguishable:—

   i. Carapace pentagonal or hexagonal, little or not at all broader than long, its lateral borders not expanded, its regions usually tumid and well defined by grooves or in-

equalities of surface: antennary flagella minute but distinct: merus of external maxillipeds a great deal more than half the length of the ischium measured along the inner border ..... EBALIA.

ii. Carapace usually much broader than long, broadly and irregularly pentagonal, its margins thin depressed and expanded, with the edges often jagged; its posterior margin being on a well-defined plane, distinct from, and much lower than, the general plane of the carapace; its surface usually traversed by ridges radiating from the centre, which do not define the regions: antennary flagella minute and difficult to detect: merus of external maxillipeds not much more than half the length of the ischium measured along the inner border ..... NURSIA.

2. Orbits very complete, and not in open communication with the antennulary fossæ: a broad space between edge of floor of orbit and free edge of buccal cavern: antennary flagella obsolete or very minute: carapace very markedly broader than long, its surface remarkably nodular, or eroded, or both; expanded laterally so as sometimes to partly or entirely conceal the legs in flexion: merus of external maxillipeds a good deal more than half the length of the ischium: immobile finger markedly more massive than the dactylus:—

i. Lateral expansions of carapace entirely concealing the legs in flexion: basal antennal joint though tightly filling the gap at the inner canthus of the orbit, yet quite independent: fingers clumsy, cupped on the inner face, closing in a vertical plane, the immobile finger monstrous:—

a. Carapace enormously convex, honeycombed by large symmetrically-disposed undermined caverns and channels ..... OREOPHORUS.

b. Carapace humped behind, flattened and cupped at the sides, the lateral margins formed each of three broad foliaceous lobes which are fused but still display the sutures ..... TLOS.

ii. Sides of carapace only partly or slightly concealing the legs in flexion: basal antennal joint fused with the orbit, which except for a narrow fissure in the lower wall forms an unbroken ring:—

a. Antennæ quite obsolete: fingers shorter than palm, opening obliquely: abdomen in both sexes with all the segments separate: meropodites of legs somewhat concealed, in flexion, by the carapace ..... ACTÆOMORPHA.

b. Antennary flagella present, very minute: fingers longer than palm, opening vertically: abdomen of female (male unknown) with the 3rd–6th terga indistinguishably fused: legs hardly at all concealed, even in flexion, by the carapace HETERONUCIA.

II. *Key to the Indian genera of the sub-family* Iliinæ.

I. Hands not much longer than broad, short squat swollen or subglobular: fingers always much longer than the hand, opening either in an obliquely vertical or sometimes in a nearly horizontal plane:—

1. The whole body and appendages covered with a close spongy pubescence:—

   i. Carapace much broader than long, its antero-lateral margins armed with large spines increasing in size from before backwards: tip of dactylus movable through an arc of about 120° ..... IPHICULUS.

   ii. Carapace oval (longitudinally) or globular, its margins with small dentiform tubercles: tip of dactylus movable through an arc of about 70° ..... PARIPHICULUS.

2. Carapace practically free of pubescence:—

   i. Carapace longer than broad, elongate-oval, smooth, shaped almost exactly as in *Myra*: tip of dactylus movable through an arc of about 120° ..... MYRODES.

   ii. Carapace broader than long, not smooth:—

      a. Carapace polygonal, with the lateral margin laminar and sinuous or jagged, and with some definite ridges and spines on the surface—shaped, in fact, much as in *Nursia*: tip of dactylus movable through an arc of about 130° ..... NURSILIA.

      b. Carapace oval, its surface closely granular and nodular, the hepatic regions much sunken: tip of dactylus movable through an arc of about 70° ..... HETEROLITHADIA.

II. Hands much longer than broad, tapering from a swollen base: fingers opening in a nearly vertical plane, the tip of the dactylus movable through an arc of 60° to 70°:—

1. Carapace more or less globular, its margins with definitely-disposed large spines or tubercles: fingers either longer or not very much shorter than the hand ..... ARCANIA.

2. Sides of the carapace produced into two huge cylindrical sausage-shaped processes: median regions of the carapace separated from the lateral regions by broad channels or grooves: figures not half the length of the hand ..... IXA.

Actæomorpha, Miers.

Actæomorpha, Miers, Journ. Linn. Soc. Zool., Vol. XIII. 1878, p. 184.

Carapace Cancroid, convex, granular. Front broad, not projecting much. Orbits quite complete. *Antennary flagella absent, basal joint present and fused with the orbit to form its inner wall.* The antennules fold obliquely.

The external maxillipeds close the buccal cavern completely: their exopodite is narrow, with the outer edge almost straight: the triangular merus is about two-thirds the length of the ischium measured along the inner border.

Chelipeds massive, not, or hardly, longer than the carapace: hand short and broad, and about the same length as the stout compressed fingers.

True legs short and stout: the meropodites, in flexion, are somewhat hidden beneath the carapace.

The abdomen in both sexes has all seven terga distinctly separate, and in the male is narrow-ovate.

In general appearance *Actæomorpha*, as Miers states, much resembles the Cancroid *Actæa granulata*: it is, however, a true Leucosid, and closely related to *Oreophorus*, as Miers has stated.

Key to the Indian species of Actæomorpha.

1. Regions of carapace separated by deep clean cut channels ... ... *A. morum.*
2. Regions of carapace separated by shallow shelving grooves ... ... *A. lapillulus.*

16. *Actæomorpha morum*, n. sp. Plate VIII. fig. 3.

Carapace broader than long, somewhat oval, strongly convex, closely covered — like the whole body — with large smooth crowded vesiculous granules. The regions of the carapace as a whole are completely isolated from a broad marginal ring by a broad sculptured circumferential groove, a very narrow bridge alone connecting the front with the gastric region: and the regions are again most elegantly isolated from each other (1) by two obliquely-longitudinal channels that cut off the acutely-triangular gastro-cardiac region from the somewhat reniform branchial regions, and (2) by a transverse channel that cuts off the semi-oval intestinal region — the channels being all in communication with the marginal channel. The isolated marginal ring consists of the front, which is thickened, broad, and slightly prominent; of the posterior margin, which is thickened, slightly curved, and slightly prominent; and of four sharp-cut lateral lobes on either side.

The eyes and orbits are visible in a dorsal view.

The chelipeds and legs are closely crowded with large granules, which on the under surface are smooth and vesiculous, and on the upper surface are spiniform. The chelipeds in the female are about as long as the carapace: the hands are about as long as the fingers: the fingers are traversed by close rows of tiny granules nearly to the tip. The legs are stout and short, with very slender hairy dactyli: in flexion they are somewhat hidden by the carapace.

Orange colour in spirit.

Two females from a bottom of sand and shells, off the Ganjam Coast, 28 to 30 fathoms. They do not seem to be quite adult, and the carapace is 10 millim. long and 12 millim. broad.

17. *Actaeomorpha lapillulus*, n. sp.

Carapace broader than long, strongly convex, crowdedly pustulous: its regions are all well-defined by shallow grooves, and the branchial and intestinal regions are also separated from the margin by shallow grooves. The front is somewhat prominent, and is obscurely bilobed; the hepatic regions though dorsally sunken are angularly convex in the antero-lateral margin, the lateral margins are coarsely and bluntly three-lobed, and the posterior margin is thickened and somewhat prominent. The eyes are hardly visible in a dorsal view. The under surface of the body is closely granular.

The chelipeds are everywhere nodular and pustulous, and the legs are more or less granular on the under surface, and are covered on the dorsal surface with crowded spiniform granules. The chelipeds in the female are about as long as the carapace, and the hands are about as long as broad and not much longer than the fingers. The legs are stout and short, and are somewhat hidden by the carapace in flexion,—that surface of the carapace being somewhat grooved by the pressure of the meropodites.

Colours in spirit: yellowish white, mottled with orange.

Two males and a female from off Ceylon, 34 fms., and a female from off Ceylon 32 fms., the bottom in both cases consisting of broken coral and shells.

The largest specimen—a female not quite adult—has a carapace 9 millim. long and 11 millim. broad.

Oreophorus, Rüppell.

Oreophorus, Rüppell, Beschreibung, etc., Kurzschwänzigen Krabben des rothen Meeres, p. 18 (1830).

Oreophorus, Milne-Edwards, Hist. Nat. Crust. II. 130.

Oreophorus, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 306, and Cat. Leucos. Brit. Mus. p. 18.

Carapace broadly semi-elliptical or subpentagonal, so that its postero-lateral margins overhang and completely conceal the legs in flexion (much as in *Calappa*); strongly convex, nodose, and often symmetrically eroded or honey-combed. The front forms a distinct, slightly upturned, triangular projection, with the orbits almost on its under surface.

Eyes small; orbits quite complete, the inner canthus being completely closed by the tight-fitting basal antennal joint. No antennary flagella. Antennules folding obliquely.

The external maxillipeds close the buccal cavern completely: their exopodite is narrow, with the outer edge almost straight: the triangular merus is nearly two-thirds the length of the ischium, measured along the inner border.

Chelipeds massive, not very much longer than the carapace: hand short and broad: fingers about twice as long as the hand, their inner surface hollowed like a spoon: the immobile finger enormously massive.

True legs small, and hidden, when flexed, by the lateral expansions of the carapace.

The abdomen of the male consists of three pieces, and is acutely triangular; that of the female consists of four pieces.

In India these little crabs are found only on bottoms of dead coral shingle, to the eroded fragments of which the crabs themselves have a most extraordinary likeness, the likeness being increased by an encrusting growth of *Foraminifera*, *Polyzoa*, etc., to which the crabs like the shingle, are subject.

18. *Oreophorus reticulatus*, Adams & White.

Oreophorus reticulatus, Adams and White, 'Samarang' Crustacea, p. 54, pl. vi. fig. 1 (1850): Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 307, and Cat. Leucos. Brit. Mus. p. 19: A. Milne-Edwards, Ann. Soc. Ent. Franc. (4) V. 1865, p. 151: Miers, Zool. H. M. S. 'Alert,' pp. 185, 254: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 111.

Carapace with three caverns, diminishing in size from before backwards, excavated just inside the front and lateral margins on either side. The caverns have undermined edges, and the first communicates with the second by a tunnel, while the second may sometimes (young) have an open communication with the third, and sometimes (adults) only the remains of a communication.

The intestinal region and the true posterior margin are insolated from the rest of the carapace by an undermined channel, which sends forwards a short branch on either side of the cardiac region. The

branchial regions are remarkably tumid, and their surface, like that of the non-excavated parts of the carapace, is reticulate-punctate: the floors of the caverns are either smooth or granular; the floor of the channel has bead-like granules scattered over it.

The whole under surface of the body is rough and granular.

The chelipeds are not quite $1\frac{1}{2}$ times the length of the carapace, and are nodular and granular: the hand is rather broader than long, and not much more than half the length of the fingers: along the outer surface of both fingers is a row of pits. The legs are slender, and are covered up to the tips of the dactyli with crisp, clavate, spiniform, or arborescent granules.

An adult (ovigerous) female has the carapace nearly 11 millim. long, and 14 millim. broad.

In the Indian Museum are 12 females and a young male from off Ceylon, 34 fms., off the Malabar coast, 28 fms., and from the Persian Gulf.

The abdomen of the young male is sunk below the level of the sternum.

18*a*. *Oreophorus reticulatus*, var. *alcicornis*, nov.

Differs from the common form in the following particulars:—

(1) The caverns are much larger, the two just behind the front being separated by a very narrow bridge.

(2) On either branchial region are three coarse spines—one on the summit and two on the lateral border: the spine on the summit is vertical and has a bifid tip.

(3) The eyes are not at all visible in a dorsal view.

A single adult female from off the Ganjam Coast, 28 fms.

Carapace 14 millim. long, 19 millim. broad.

Tlos, Adams and White.

Tlos, Adams and White, 'Samarang' Crustacea, p. 57.
Tlos, A. Milne-Edwards, Nouv. Archiv. du Mus. X. 1874, p. 51.

Tlos differs from *Oreophorus* chiefly in having the anterior and lateral parts of the carapace flat and the margin of the carapace turned up, so that although the cardiac and parts of the branchial regions are convex, the carapace as a whole is cupped. This is in marked contrast with the inflated form of *Oreophorus*, and constitutes the only difference between the two forms.

19. *Tlos petræus*, A. Milne-Edwards.

Tlos petræus, A. Milne-Edwards, Nouv. Archiv. du Mus. X. 1874, p. 51, pl. iii. fig. 1.

Carapace broadly pentagonal; with the front somewhat produced, bluntly triangular, and slightly emarginate. The margins of the carapace are thickened, roughened, and somewhat upturned. Each wing of the carapace shows a division into three broad lobes, but the divisions are only sutures, not gaps. Except for a ridge running from the front to the cardiac region, and except for a granular node just external to the cardiac region on either side and for a little thickening between each node and the postero-lateral angle, the surface of the carapace is smooth and concave. The under surface of the body is granular. The orbits are almost ventral in position, and the eyes are not visible in a dorsal view.

The chelipeds in the female are not quite as long as the carapace: the arm is trigonal with enlarged granules along all its borders, the wrist and hand are rough, and the dactylus is fluted. The hand is as broad as long, and is continued without any sort of constriction into the great shovel-shaped immobile finger, which is about as long as the hand and vastly more massive than the dactylus. The legs are compressed, and have their dorsal and ventral surfaces granular: in flexion they are hidden beneath the wings of the carapace.

In the abdomen of the male the terga although a good deal fused are all separately recognizable, and there is a denticle in the middle line on the 4th and 6th.

An adult (ovigerous) female has the carapace 7 millim. long, and 10 millim. broad.

Andamans, Off Ceylon 34 fms., Pedro Shoal 20 fms. Eight specimens.

20. *Tlos patella*, n. sp. Plate VIII. fig. 4.

Carapace transversely oval, and closely covered with granules which under the lens are fungiform: the carapace is traversed by a longitudinal ridge, and the branchial regions are convex in their posterior part; but the wings of the carapace are cupped dorsally, much as in *T. petræus*, and are divided by closed sutures into three broad lobes.

The front hardly breaks beyond the general outline of the carapace, and has its edge thickened. The eyes can just be seen in a dorsal view.

The intestinal region is convex backwards, and the bilobed (true) posterior margin still more so.

The under surface of the body is granular, much like the upper surface.

The chelipeds in the female are about one-fourth longer than the carapace, and are closely covered with small flat smooth granules: the arm is trigonal, with larger granules along the edges: the hand is somewhat inflated, a little longer than broad, and not much more than half the length of the fingers: the fingers are curved and are hollowed on the inner face: the immobile finger is distinctly constricted off from the hand, and is not vastly more massive than the mobile finger.

The legs are as in *T. petræus*.

The largest adult (ovigerous) female has the carapace 9 millim. long and 11 millim. broad.

Loc. Andamans. Seven females.

Heteronucia, n. gen.

Carapace strongly convex, broader than long, its surface both granular and tubercular (or coarsely spinous): the regions distinct.

Front bidentate, sunk behind the edge of the mouth-parts and of the puffed out pterygostomian regions.

Orbits complete but shallow, not concealing the rather large eyes in flexion. The basal antennal joint is fused with the orbit and with the front, and the extremely minute antennary flagellum is entirely inside the orbital wall. The antennules fold obliquely.

The epistome is exceptionally broad.

The external maxillipeds completely close the buccal cavern; the exopodite is narrow, with the outer edge straight; the merus is about two-thirds the length of the ischium measured along the inner border.

The chelipeds are massive and are about half again as long as the carapace: the hand is short, broad and swollen: fingers a good deal longer than the hand, stout, closely meeting throughout their extent, curved and concave on their inner face, opening vertically: the immobile finger is a good deal more massive than the dactylus.

Legs stout, the meropodites slightly hidden in flexion.

This species has, at first sight, a general resemblance to *Nucia speciosa*, but is at once distinguished by the form of the orbits, antennæ and chelipeds.

21. *Heteronucia vesiculosa*, n. sp. Plate VIII. fig. 1.

The whole surface of the body and of the appendages (except the fingers and dactyli) is covered with crowded vesiculous granules without any space between them.

Carapace a good deal broader than long, strongly convex: on either lateral margin are eight coarse spines or acute tubercles, the first of which is at the antero-external angle of the buccal cavern, the last of which is at the junction with the posterior border: in addition the

whole dorsum of the carapace is occupied by a "pyramid" (as on the billiard table) of 8 or 9 similar coarse spines or acute tubercles—the apex of the pyramid being on the intestinal region—and there is, further, a coarse denticle on either hepatic region: the surface of all these is densely vesiculous.

The front is broadly bidentate, and the whole of the front edge of the buccal cavern and of the tips of the external maxillipeds can be seen beyond it in a dorsal view. There is a tubercle near the base of the distal piece of the exognath.

The chelipeds are stout, and are rather more than half again as long as the carapace: the hand is subglobular: the fingers are somewhat longer than the hand, are elegantly grooved, meet in all their extent, open nearly vertically, and are hollowed and curved inwards; the dactylus is less massive than the immobile finger: at the base of the dactylus, on the upper surface of the hand is a small tubercle.

The abdomen of the female consists of 4 pieces—the 3rd to 5th terga being fused.

Colours in spirit light orange yellow.

An ovigerous female has the carapace 5 millim. long and 6 millim. broad.

Loc. Off Ceylon, 34 fms.

Nursia, Leach.

Nursia, Leach, Zool. Miscell. III. p. 18.

Nursia, Milne-Edwards, Hist. Nat. Crust. II. 137.

Nursia, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 307, and Cat. Leucos. Brit. Mus. p. 19.

Carapace with a broad, usually depressed, symmetrically-wrinkled surface, and with expanded, foliaceous, sinuous, scallopped, or jagged lateral and posterior margins,—the lateral margins somewhat concealing the true legs in flexion. Front projecting beyond the epistome and usually well beyond the eyes.

Orbits with two sutures in the roof, and a gap at the inner canthus, and with the upper-outer wall so emarginate as to leave the fully-retracted eye exposed to dorsal view.

Antennules folding obliquely. Antennæ, minute, situated in the inner canthus of the orbit.

Buccal cavern about as long as it is broad at base, and somewhat narrowed anteriorly; the exognath not dilated, its outer edge a little curved: the triangular merus is a little over half the length of the ischium, measured along the inner edge.

The chelipeds relatively to the legs are very massive: in the male they vary from $1\frac{1}{2}$ times to over twice the length of the carapace:

arms sharply trigonal; hands a good deal compressed; fingers stout and compressed, about half or two-thirds the length of the hand.

The abdomen of the male consists, usually, of 3 pieces, that of the female of 4.

Key to the Indian species of Nursia.

I. An oblique ridge crossing either hepatic region, in addition to the longitudinal, transverse, and epibranchial ridges: upper surface of hand convex, but without a conspicuous median ridge:—

1. The posterior margin of the carapace has the form of two blunt semicircular lobes: the lateral margins are sinuous, or only bluntly jagged: chelipeds in the adult male less than twice the length of the carapace:—

i. Lateral margins jagged: front with a coarse thickened granular edge, and not projecting much beyond the eyes: carapace much broader than long ... ... *N. plicata.*

ii. Lateral margins sinuous: front in the form of a large ovate snout, projecting far beyond the eyes: carapace nearly as long as broad:—

a. Outer surface of wrist and hand bluntly and inconspicuously carinate: ridges of carapace coarse and granular: snout semicircularly rounded ... *N. blanfordi.*

b. Outer surface of wrist and hand sharply and conspicuously cristate: ridges of carapace clean-cut: snout ovate-pointed *N. nasuta.*

2. The posterior margin of the carapace has the form of two sharp laminar teeth: the lateral margins are sharply jagged: front sharply 4-denticulate:

chelipeds, in the adult male, more than twice the length of the carapace *N. hardwickii.*

II. No trace of an oblique ridge on the hepatic regions or of a transverse ridge behind the branchial regions, the longitudinal and epibranchial ridges alone present: posterior margin not manifestly bilobed: upper surface of hand traversed from base to finger-cleft by a distinct ridge:—

1. Carapace convex: front broadly bidentate ... ... *N. persica.*
2. Carapace almost laminar: front broadly pointed ... ... *N. abbreviata.*

III. No ridges at all on the carapace: margins not manifestly sinuous ... ... *N. rubifera.*

22. *Nursia plicata*, (Herbst) *nec auctorum.*

Cancer plicatus, Herbst, Krabben III. iv. 2, pl. lix. fig. 2.

Carapace about three-quarters as long as broad, *with the posterior margin in the form of two semi-circular dorsally-concave lobes.* The foliaceous lateral margins are scallopped, each into four blunt teeth: in front of the first of these (which is rounded off), on either side, is a thickened marginal nodule; and the last, on either side, are united by a coarse granular ridge running across the carapace parallel with the posterior margin, which it cuts off from the rest of the carapace. This ridge culminates, in the middle line, in a coarse granular tubercle.

The middle of the carapace forms a coarsely-granular eminence surmounted by 3 tubercles in a triangle. From it six blunt coarsely-granular ridges radiate, as follows:—one forwards, in the middle line, to the front; one backwards, in the middle line, to the transverse ridge; one obliquely forwards, across the hepatic region on either side, to the nodule on the hepatic margin; and one obliquely backwards to the penultimate lateral tooth on either side. The spaces between the ridges are markedly concave, and are usually smooth.

The front hardly projects beyond the eyes, and has a coarse thickened granular edge: *it is usually obscurely bilobed, and never quadrilentate.*

The surfaces of the external maxillipeds, of the pterygostomian regions, of the thoracic sterna, and of the proximal part of the male abdomen are distinctly granular.

The chelipeds in the adult male are $1\frac{3}{4}$ *times, in the adult female about* $1\frac{1}{4}$ *times the length of the carapace:* the arm has only its outer border

carinate,—the carina being coarse and granular ; the base of its upper surface, the inner border, and the base of the under surface and the under border are also granular to the naked eye : the outer edges of the wrist and hand are coarsely and inconspicuously carinate : the fingers are stout, are rather strongly bent inwards, and have the opposed edges almost edentulous : *the dactylus is more than three-quarters the length of the outer border of the hand*, in both sexes.

The true legs are not much longer than the arm, and are compressed : in all the merus and propodite are sharply carinate dorsally and ventrally, the carpus has two sharp dorsal crests, and the dactylus is closely pubescent.

The abdomen of the male consists of two linear basal pieces and a small triangular apical piece, and between the two a long triangular plate with a median sub-terminal tooth.

Length of carapace of the largest male, 15 millim., breadth 20 millim. : length of carapace of largest female 16 millim., breadth 22 millim.

Old spirit specimens are uniform flesh-colour : but fresh spirit specimens are a bright brick red, with the wings of the carapace, and a medium longitudinal band including the front, yellowish white.

In the Indian Museum are 8 adult males, 6 adult and egg-laden females, and one young, from the Orissa Coast, Tinnevelly coast, Palk Straits, Bombay, Karáchi, and the Persian Gulf. [Besides these there are 4 adult females and a male from Hongkong].

23. *Nursia hardwickii*, Leach.

Nursia hardwickii, Leach, Zool. Miscell. III., p. 20 : Desmarest, Consid. Crust. p. 163 : Milne-Edwards, Hist. Nat. Crust. II. 137.

Nursia plicata, Bell, Trans. Linn. Soc. Vol. XXI. 1855. p. 307, pl. xxxiv. fig. 4, and Cat. Leucos. Brit. Mus., p. 19 (*nec* Herbst) : Stimpson, Proc. Ac. Nat. Sci. Philad. 1858. p. 161 (?) : Miers, Trans. Linn. Soc. Zool., (2) I. p 240, pl. xxxviii. fig. 28 : Haswell, Cat. Austral. Crust. p. 127 (?) : de Man, Notes Leyden Mus. III. 1881, p. 129 : A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. p. 111 (?) : J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 404.

The general form is that of *N. plicata* Herbst, but much finer and cleaner cut ; and with the anterior part of the carapace narrower and the front projecting.

The posterior margin of the carapace has the form of two sharp-cut laminar teeth ; and the three last teeth on either lateral margin are thin and sharp.

The crests on the carapace are thin and sharp, and very finely granular ; and the elevation from which they radiate is defined by three sharp denticles : the transverse ridge that unites the two last marginal teeth across the carapace culminates, in the middle line, in a denticle.

The front distinctly projects beyond the eyes; *its margin is thin and sharp and is cut into four teeth:* the antero-lateral margins do not run up to the level of the tip of the front, involving the orbits, as they do in *N. plicata.*

The granulation on the ventral surfaces, unlike that of *N. plicata*, is hardly visible to the naked eye.

The chelipeds in the adult male are $2\frac{1}{3}$ *times, in not-quite-half-grown males* $1\frac{7}{8}$ *times, and in adult females* $1\frac{1}{2}$ *times the length of the carapace:* to the naked eye they are perfectly smooth: the outer edges of the arm, wrist and hand are *sharply* carinate: *the dactylus in the male is little more than half the length of the outer edge of the hand.*

Uniform flesh-colour in spirit.

Length of carapace in the adult male 14 to 15 millim., breadth about 19 millim.; in the adult female length 12 to 13 millim., breadth about 16 millim.

In the Indian Museum collection are 18 adult males, 8 adult females, and 2 young males taken at various places along the Coromandel coast, from Ganjam to Pondicherry.

24. *Nursia blanfordi*, n. sp. Plate VII. fig. 5.

Carapace, except that it is nearly as long as broad, of the same general appearance as in *N. plicata*, Herbst, with the same two semicircular lobes on the posterior margin, and the same number of *blunt* teeth on the lateral margin,—the teeth, however, being blunter, and the first two on either side nearly confluent.

The ridges that radiate from the centre of the carapace, though of the same coarse and coarsely-granular form as in *N. plicata*, differ somewhat in arrangement: the median longitudinal ridge, the ridges that run obliquely outwards to the hepatic margin on either side, and the transverse ridge that unites the last lateral teeth across the carapace, are the same; but the epibranchial ridges that run to the penultimate lateral tooth on either side are so little oblique in the greater part of their extent as to form an almost transverse crest across the carapace, parallel with the first-mentioned transverse ridge and with the posterior margin. The triangle of denticles on the mid-gastric region, and the denticle on the second transverse crest are as distinct and sharp, especially in the male, as they are in *N. hardwickii.*

The front has the form of a semi-circular foliaceous snout, projecting far beyond the eyes, and somewhat recurved upwards.

Both the exopodite and the endopodite of the external maxillipeds are traversed longitudinally by a raised line of enlarged granules.

The chelipeds in the male are about $1\frac{3}{4}$ times, in the female about

$1\frac{1}{3}$ times, the length of the carapace, and their surface is everywhere finely granular, except on the fingers, which are of the same form and proportions as in *N. plicata*: the arm is trigonal, with all the edges sharp, and the outer edges of the wrist and hand are coarsely, but distinctly, carinate.

The legs have the merus, carpus and propodite faintly carinate dorsally.

The abdomen of the male consists of 3 pieces, the large middle piece having a subterminal denticle.

Colours in spirit, uniform light brownish.

The ovigerous female has the carapace 8 millim. long and 8·5 millim. broad: the male is slightly smaller.

Persian Gulf, 52 fathoms, dredged by Mr. W. T. Blanford, F. R. S., to whom the Indian Museum collections owe so many valuable additions. Also from the Mekrán coast. Six specimens are in the Indian Museum.

25. *Nursia nasuta*, n. sp. Plate VII. fig. 6.

Resembles *N. blanfordi* in almost all its characters, especially in having the carapace nearly as long as broad, and the front in the form of a large curved foliaceous snout; but differs in the following particulars:—

(1) the front is sharper and even longer, and in shape is pointed-ovate:

(2) the ridges of the carapace are little granular, and the oblique ridges that cross the hepatic regions are obsolescent:

(3) the outer edge of the wrist and of the hand are raised each into a thin sharp high crest:

(4) the size is even more minute, the largest specimens (ovigerous females) having the carapace from 5 to 6 millim. long and from 5·25 to 6·25 millim. broad.

Loc. Off the Malabar coast, 28 fathoms. Two adult males and 6 adult females.

26. *Nursia persica*, n. sp. Plate VII. fig. 7.

Carapace about nine-tenths as long as broad, its lateral margins expanded and cristiform, but not scallopped, only sinuous (much as in *N. abbreviata*), forming three shallow lobules on either side: posterior margin laminar, perfectly straight, with a spot of dark red (in spirit) pigment in the middle line.

The carapace, which is rather strongly convex, is traversed longitudinally, in the middle line, by a broad sharp-edged ridge that ends

at a tubercle in the intestinal region, and is again crossed transversely by a similar ridge, which is strongly convex forwards: these are the only ridges on the carapace.

The front has the form of two broad sharp-cut teeth which are prominent beyond the eyes.

The outer margins both of the endopodite and of the exopodite of the external maxillipeds are granular and somewhat raised.

The exposed surfaces of the thoracic sterna, and of the carapace round the bases of the chelipeds, are covered with large granules (in the female—male unknown).

The chelipeds in the female are very little longer than the carapace: the arm is sharply trigonal, with the edges coarsely granular: the wrist and hand have the upper surface rough: the edges of the hand are sharp, and the upper surface of the hand is traversed, from its base to the finger-cleft, by a sharp finely-beaded ridge, as in *N. abbreviata*: the fingers (in the female) are about two-thirds as long as the hand, and are finely denticulate.

The legs are slender and compressed, with the merus, carpus and propodite sharply carinate dorsally.

Colours in spirit: mottled like Castile soap.

Length of carapace 9 millim., breadth 10·5 millim.

A single ovigerous female from the Persian Gulf.

This species well illustrates the close relation between *Nursia* and *Tlos*.

27. *Nursia abbreviata*, Bell.

Nursia abbreviata, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 308, pl. xxxiv. fig. 5, and Cat. Leucos. Brit. Mus. p. 20: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 404.

Carapace about eight-ninths as long as broad, abnormally depressed—almost laminar—except in the mid-gastric region, which is somewhat angularly elevated: its borders, behind the front, are thin, foliaceously expanded and sinuous, forming 7 shallow lobules, the least distinct of which is the posterior border, which again is very inconspicuously subdivided by a faint emargination in the middle line: the whole of the free edge of the carapace is finely beaded, and slightly upturned, so as to emphasize the depressed appearance of the carapace.

An anteriorly-convex milled carina crosses the carapace from one lateral margin to the other, and is met in the middle line by a milled ridge running from the front: these are the only ridges on the carapace. There is granular elevation in the cardiac region, otherwise the carapace is smooth. The front is broad and prominent with the edge a little convex.

The pterygostomian region is traversed by a sharp ridge that runs parallel with the antero-lateral border.

The external maxillipeds, the edge of the sternum, and the entire edge of the fossa that receives the abdomen, are ornamented with beadlike granules, in the male.

The chelipeds in the male are a little more than half again as long as the carapace and in the female are not one-fourth longer than the carapace: the arm is sharply trigonal, with all the edges granular and the surfaces smooth: the upper surface of the wrist and hand are traversed, up to the finger cleft, by a sharply-raised beaded ridge: the fingers are about two-thirds the length of the hand, and meet only at tip.

The abdomen of the male consists of three pieces, the long middle piece having a sub-terminal denticle.

Colours in spirit: yellowish-brown mottled with greenish-brown, which on the arm, on the base of the hand, on the base of the fingers, and on the legs, forms cross-bands.

Eight males and five adult females, from Karáchi, the carapace of the largest male and female being 9 millim. long, and 10 millim. broad. Three very young specimens from the Coromandel coast are almost certainly this species.

28. *Nursia rubifera*, Müller.

Nursia rubifera, Müller, Verhandl. Naturforsch. Ges. Basel, VIII. 1886, p. 480, pl. iv. figs. 4, 4*a*, 4*b*.

Carapace broader than long, outline oval, — very inconspicuously polyhedral, edge cockled and finely granular. Front prominent, *bilobed*. Two isolated granular tubercles in the middle line — one in the gastric, one (smaller) in the cardiac region; but *no ridges*. Outer border of exognath strongly curved. Chelipeds in the male about half again as long as the carapace: arm sharply trigonal, with all three edges granular: a sharp longitudinal ridge on upper surface of hand: fingers meeting throughout their extent.

Irregular lilac stripes on the carapace and cross-bands on legs.

Loc. Trincomalee.

Not in the Indian Museum collection. Known here only from Müller's description and figures.

The species, as Müller says, is nearest allied to *N. abbreviata*, and is also closely related to *N. persica*.

Ebalia, Leach.

Ebalia, Leach, Malac. Pod. Brit. text of pl. xxv. and Zool. Miscell. III. p. 18.
Ebalia, Milne Edwards, Hist. Nat. Crust. II. 128.

Ebalia, Bell, Brit. Stalk-eyed Crust. p. 139, and Trans. Linn. Soc. Vol. XXI. 1855, p. 303, and Cat. Leucos. Brit. Mus. p. 16.

Ebalia, Miers 'Challenger' Brachyura p. 303 (part).

Carapace rhomboidal or pentagonal or hexagonal; commonly, but not always, a little broader than long; its regions generally well defined and tumid, the tumid portions nodular or granular: its posterior margin is generally a little prominent and either bilobed, or with its extreme ends dentiform.

The front is not much produced in Indian species, except in *Ebalia* (*Phlyxia*) *erosa*.

In the orbital wall, as usual, there are three sutures, and a gap at the inner canthus: the edge of the roof of the orbit is considerably emarginate. The antennules fold obliquely or nearly transversely. The antennæ are minute but distinct.

The buccal cavern is moderately elongate: the exopodite of the external maxillipeds is not dilated, its outer edge is a little curved: the triangular merus of the external maxillipeds is about $\frac{3}{4}$ the length of the ischium measured along the inner border.

The chelipeds are variable: they are usually massive. In the typical *Ebalia* forms they are short—not much more than half again as long as the carapace—and stout, with short broad hands not much differing in length from the stout compressed fingers.

The abdomen of the male consists of 3 or 4 pieces.

Key to the Indian species of Ebalia.

I. Front much produced: carapace markedly longer than broad ..... *E. erosa.*

II. Front not produced: carapace either a little broader than long or a very little longer than broad:—

1. Edge of buccal cavern projecting a little beyond the front: posterior border of the carapace with three rounded teeth in the male and two (much less distinct) in the female: a large granular "broad arrow" on the carapace the ends of the wings of which project beyond the postero-lateral margin... *E. sagittifera.*
2. Edge of front projecting beyond the epistome: ends of posterior margin thickened and obscurely dentiform.

i. Dorsum of carapace deeply and very elegantly trilobed longitudinally..... *E. diadumena.*

ii. Carapace hexagonal, dorsum with 4 granular swellings arranged in a "cross"... *E. wood-masoni.*

I have not included the species referred to by Dr. Henderson as *Ebalia pfefferi* and *Ebalia fallax* in this key, because the first appears to belong to Dana's genus *Nucia*, which in my opinion has no close affinity with Leach's genus, while the second is quite clearly a form belonging to the *Ilia* alliance, as it has the *Ilia* fingers hands and external maxillipeds.

29. *Ebalia diadumena*, n. sp. Plate VII. fig. 4.

Carapace rhomboidal, a little broader than long, its dorsal surface divided into three tumid crisply granular and most elegantly shaped lobes (a gastro-cardiaco-intestinal and two branchial—forming a sort of *fleur de lys*) by two extremely deep smooth longitudinal furrows. On the middle lobe the gastric and cardiac regions are separated by a shallow groove, and the cardiac and intestinal by a deep furrow. The hepatic regions are also distinctly circumscribed, but are altogether on a much lower plane than the rest of the carapace, and like the front are only indistinctly granular.

The front is divided, from its hardly emarginate edge down to the gastric region, by a narrow deepish longitudinal groove. Behind the front the angular pterygostomian ridge is somewhat prominent. The lateral margins are finely crenulate: the posterior margin is almost straight, with the ends somewhat dentiform.

The surfaces of both branches of the external maxillipeds are tumid and granular.

The chelipeds in the female (male unknown) are not very much longer than the carapace: the arm is trigonal and the greater part of all its surfaces is crisply granular, as also are large parts of the surfaces of the wrists and hands: the fingers are not much shorter than the hand and are elegantly striate-granular: the hand is not very much longer than broad.

The carapace of the adult female is 4 millim. long and 4·5 millim. broad.

A single ovigerous female from Palk Straits.

Colours in spirit lilac brown, the furrows on the carapace dark violet brown.

30. *Ebalia woodmasoni*, n. sp. Plate VII. fig. 3.

Carapace sharply hexagonal, its length just exceeds its breadth in the male, its breadth is equal to its length in the female.

Four large well-defined (especially in the male) granule-capped swellings or tubercles mark, respectively, the cardiac, intestinal, and branchial regions, and two small indistinct swellings mark the hepatic regions: the hollows between the larger swellings are elegantly punctulate.

Antero-lateral borders finely and inconspicuously, postero-lateral and posterior borders finely and distinctly beaded; the posterior border prominent and straight, with its ends more prominent—giving it a bilobed appearance.

Front angularly emarginate or broadly bidentate. Eyes rather large and not well concealed by the orbits.

Exposed parts of sternum granular, the first segment, in the male, with a strong longitudinal ridge or boss near the base of either cheliped.

Chelipeds in both sexes half again as long as the carapace: arm trigonal, its upper surface with some rows of enlarged beadlike granules along both borders, its under surface with a broad tapering band of similar granules: hand nearly twice as long as broad, and from $\frac{1}{4}$ to $\frac{1}{3}$ longer than the fingers.

Abdomen of male with a very strong terminal tooth on its penultimate segment.

In the male the carapace is 5 millim. long and 4·8 millim. broad, in the adult female it is 5 millim. in both dimensions.

Loc. Andamans.

This species appears to be near *Ebalia quadrata*, A. M.-E., from Bass' Straits, and to Miers' *Ebalia rhomboidalis*, *minor* and *bituberculata*, from Japan.

31. *Ebalia sagittifera*, n. sp.

Carapace hexagonal, although hardly longer than broad yet of an elongate appearance, owing to the unusual length and very gradual convergence of the postero-lateral borders: the whole antero-lateral margin is sharp, slightly curled and elegantly striated or milled: the edge of the subhepatic regions, or pterygostomian ridges, are extremely prominent, standing out on either side like a pair of little wings. In the male the posterior margin bears a petaloid tubercle at either end and a denticle in the middle line: in the adult female the lateral tubercles are indistinct and the median tubercle absent.

The front is emarginate, and part of the edge of the buccal cavern can be seen beyond it in a dorsal view.

On the carapace are three broad granular ribs which unite to form a "broad-arrow," point forwards: the middle ridge begins about the middle of the gastric and ends in the middle of the intestinal region, the lateral ribs run obliquely backwards and outwards, parallel with the antero-lateral margins, across the branchial regions, their ends projecting well beyond the postero-lateral borders in the male, but not so much in the female.

The chelipeds are about half again as long as the carapace: the arm is trigonal with the edges raised and granular: the wrist and hand have a raised row of granules along the inner edge of their upper surface: the hand is about two-thirds as broad as long, and the fingers are about two-thirds the length of the hand.

The abdomen of the male consists of only two pieces, and is without a denticle.

Colours in spirit: mottled dark green and greenish brown, legs and chelipeds with black-speckled cross-bands.

Length of carapace of male 5 millim. long, 4·5 millim. broad; of ovigerous female 6 millim. long, 5·75 millim. broad.

Loc. Karáchi.

As in *Ebalia erosa* the space between the lower edge of the orbit and the edge of the buccal frame is much reduced. This species appears to be closely related to *Ebalia hypsilon*, Ortmann, in Semon's Zool. Forschungreisen Austral. u. Malay. Arch., Crust. p. 36, pl. ii. fig. 7.

32. *Ebalia erosa*, (A. Milne Edwards).

Phlyxia erosa, A. Milne Edwards, Journ. Mus. Godeff. I. iv. 1873, p. 262, and Nouv. Archiv. du Mus. X. p. 47, pl. iii. fig. 2: Haswell, P. L. S. N. S. Wales, IV. 1879, p. 54, and Cat. Austral. Crust. p. 125: Miers, P. Z. S. 1884, pp. 10, 13.

Ebalia erosa, Miers, 'Challenger' Brachyura p. 305: Ortmann, Zool. Jahrbuch. Syst., etc., VI. 1892, p. 580.

Carapace longer than broad, somewhat piriform, with a produced narrow bidentate front from which a prominent ridge runs straight back to the cardiac region, with the hepatic and subhepatic regions angularly prominent, and with three dentiform projections—one of which is the acuminate tip of the tumid intestinal region—on the prominent posterior margin. On the posterior half of the carapace there are some large symmetrically disposed tubercles, usually about 9 in number (3 on either branchial region and 3 on the cardiac region) and sometimes more or less confluent: the three on the cardiac region are always very distinct and are so connected as to form an elegant V, or with the ridge from the front an "anchor," and however much the branchial tubercles may be confluent one on either side of the V is

always enlarged and acuminate. The tubercles, the tumid intestinal region, and sometimes also the intervening hollows, are crisply granular.

The buccal cavern is elongate.

The chelipeds in both sexes are little longer than the carapace, and are rather slender: they are finely granular, especially the arms. The hand is a little broader at its proximal than at its distal end, where it is about half as long as broad: the fingers are little more than half the length of the hand.

Colours in spirit ivory white.

The carapace of the male is about 6 millim. long and 5 millim. broad: that of the adult female is 9 millim. long and 7 millim. broad.

Numerous specimens are in the Indian Museum, from the Maldives and Andamans.

Nucia, Dana.

Nucia, Dana, U. S. Expl. Exped., Crust. pt. I. p. 397.
Nucia, Bell, Cat. Leucos. Brit. Mus. p. 24.

Carapace strongly convex, broad, transversely somewhat ovoidal in shape, its surface uneven and densely covered with vesiculous or pustulous granules, and with the regions usually well demarcated.

The front is narrow, broadly bidentate, and somewhat sunk behind the level of the front edge of the buccal cavern. The pterygostomian regions are puffed out so as to increase the squat and sunken appearance of the front. There is a remarkably broad interval between the orbits and the edge of the buccal cavern.

The eyes are large, and the orbits have the upper edge deeply emarginate so that the retracted eye is hardly at all concealed. The antennules fold obliquely, and the antennæ have the basal joint rather closely filling the gap at the inner canthus of the orbit and the flagellum small but distinct.

The buccal cavern is moderately elongate: the exognath is not dilated and has the outer border almost straight: the triangular merus of the endognath is not much shorter than the ischium measured along its inner edge.

The chelipeds are very short and stout: the legs also are remarkably stout.

In the Indian Museum Collection, the only representative of this genus is a male specimen of *Nucia speciosa*, Dana, from Upolu. This is, quite clearly, closely allied to the species named *Randallia pustulosa* and *Randallia lamellidentata* by Wood-Mason. [Whether these are really *Randallia* as defined by Stimpson it is difficult to say; but they are certainly congeneric with Miers' *Randallia granulata* ('Challenger' Brachyura, p. 317, pl. xxvi. fig. 1)].

33. *Nucia pfefferi*, (de Man).

Ebalia pfefferi, de Man, Archiv. für Naturges. LIII. 1887, i. p. 390, pl. xvii. fig. 4: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402.

As there seems to be some doubt whether this species is really distinct from *Nucia speciosa*, Dana, U. S. Expl. Exp. Crust. pt. I. p. 397, pl. xxv. fig. 5*a* I must here be content to give only the references. It is included in the Indian fauna on the authority of Dr. J. R. Henderson.

Randallia, Stimpson.

Randallia, Stimpson, Journal Boston Soc. Nat. Hist. Vol. VI. 1857, p. 471.
Randallia, Miers, 'Challenger' Brachyura, p. 316.

Carapace circular and convex, almost globular; with the front narrow, usually broadly bidentate, and somewhat sunk behind the level of the front edge of the buccal cavern. The subhepatic or pterygostomian regions are convex and puffed out, so as to increase the squat and sunken appearance of the front. There is a remarkably broad vertical interval between the orbits and the edge of the buccal cavern.

The surface of the carapace is, typically, covered with vesicular or pustulous granules, but these are sometimes visible only with a lens: the regions are usually, but not always, distinctly demarcated by grooves.

The posterior margin is generally, but not always, armed with spines or petaloid lobules or tubercles.

The orbits are almost as imperfect as they are in *Parilia*: their upper edge is deeply emarginate, there is a wide gap at the inner canthus, and there are three very distinct sutures, or sometimes actual fissures, in the upper-outer wall.

The antennules fold obliquely: in one Indian species their basal joint forms a close-fitting operculum to the antennulary fossa. The antennæ are very distinct, and are loosely lodged in the inner canthus of the orbits.

The buccal cavern is triangular and somewhat elongate: the exognath is not dilated and its outer margin is almost straight: the triangular merus of the endognath is about $\frac{2}{3}$ the length of the ischium measured along its inner edge.

Chelipeds either massive or moderately stout, of moderate length; fingers stout, about as long as the hand, which is not more—but is usually much less—than half the length of the carapace.

Although there is, as usual, some fusion among the abdominal terga, yet the sutures are never wholly obliterated as they are in most other Leucosines.

Key to the Indian species of Randallia.

I. The basal joint of the antennules forms a close-fitting operculum to the antennulary fossa: the whole body and appendages are covered with a dense velvety pubescence: front very indistinctly emarginate ..... *R. lanata.*

II. The antennules fold loosely in their fossæ: body and appendages devoid of pubescence: front distinctly bidentate:—

1. Carapace granulous or pustulous, the regions defined by grooves:—

i. Front separated from the carapace by a conspicuous transverse groove: intestinal region tumid but not culminating in a spine: tip of exognaths (and often of adjoining points) blister-like ..... *R. pustulilabris.*

ii. No deep groove at the base of the front: intestinal region culminating in a spine, the tip of which overhangs the posterior margin of the carapace: end of exognaths sharp:—

(*a*) Chelipeds rather elongate and slender, twice the length of the carapace: hand subcylindrical and rather elongate: antero-later margins of carapace with simple tubercles or spines ..... *R. pustulosa.*

(*b*) Chelipeds short and stout, less than twice the length of the carapace: hand short and stout, its outer border, like that of the fingers, very sharply cristiform: antero-lateral margins of carapace with laminiform teeth ..... *R. lamellidentata.*

2. Carapace smooth and polished to the naked eye, the regions not or hardly defined:—

i. Chelipeds rather elongate and slender, more than twice the length of the

carapace: three round laminiform lobes on the posterior margin of the carapace ..... *R. eburnea.*

ii. Chelipeds short and stout, less than twice the length of the carapace: posterior margin of carapace differing from that of all the other species in being quite smooth ..... *R. glans.*

34. *Randallia lanata*, n. sp.

The whole of the body and its appendages covered with a close, short, light-coloured, velvety pubescence.

Carapace circular, globular, with all the regions well defined by grooves; its surface covered, beneath the pubescence, with rather distant pustulous granules. Behind the front all the margins of the denuded carapace are armed with blunt dentiform tubercles or granules. There is a not very distinct notch between the hepatic and branchial regions.

The front has an almost straight edge, and although it is for the genus rather prominent, the ends of the external maxillipeds can be seen beyond it in a dorsal view.

The orbits are so emarginate above as to afford little concealment to the retracted eye, which is rather large.

The antennules fold obliquely, their basal joint forming a close-fitting operculum to the antennulary fossæ.

The chelipeds are similar in both sexes, being stout and about half again as long as the carapace: the hand is very stout, is not much longer than broad, and is about one-third the length of the carapace: the fingers are stout and are about three-fourths the length of the hand. The legs are stoutish.

In both sexes all seven abdominal terga are plainly and independently recognizable though not all independently movable: in the female (even in the ovigerous adult) the abdomen is somewhat narrow.

In the adult male the carapace is 7 millim. long and 6·5 millim. broad, in the adult female it is 8·5 millim. in both diameters.

Andaman Sea usually at over 30 fathoms.

35. *Randallia pustulilabris*, n. sp.

Leucosilia granulosa, Alcock and Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 207, and Ill. Zool. Investigator, Crustacea, pl. xxiv. fig. 3 (*in the press*).

Carapace slightly broader than long, globular: truncated anteriorly,

so that the external maxillipeds are visible beyond the front: very densely covered, as are also the chelipeds, with bead-like granulations: the regions delimited by shallow yet distinct furrows. The rostrum consists of two divergent hollow lobes, the tips of which are curved slightly outwards, beneath which the antennules are lodged, as in the other species of this genus: *immediately behind the rostrum the carapace is traversed from side to side by a deep groove.* The antero-lateral margin is interrupted by a deep notch, in front of which is a coarse blunt hepatic tooth, while behind it is a stronger epibranchial tooth. The lateral angle is also marked by a prominent granule. The posterior margin is almost straight and bears three dentiform tubercles, of which the median is hardly conspicuous. The hepatic regions are inflated, as are also the sides of the gastric region. The intestinal region forms a tumid boss, on the summit of which the granulations are obsolescent.

The tips of both rami of the densely granular external maxillipeds are strongly bent upwards, as in all the other species of this genus, that of the exognath ending in a large blister-like tubercle. [Sometimes also the outer angles of the buccal cavern, the tips of the frontal teeth, and the edges of the orbit end in similar, but smaller, blister-like swellings].

The chelipeds in the male are a little less than twice the length of the carapace, and are stout: the fingers are stout, and are about as long as the hand, which is rather more than two-fifths the length of the carapace. Legs smooth: dactyli with a few hairs.

The 3rd to the 5th abdominal terga are fused in the male, but are independently recognizable, and the 6th has a terminal denticle — not very conspicuous: in the female the 3rd to the 6th are fused.

	Male.	Female.
Length of carapace.....	6·5 millim.	7·5 millim.
Breadth of carapace.....	7·0 millim.	9·0 millim.
Greatest span (of chelipeds).....	24·0 millim.	26·5 millim.

Besides being smaller, and having the chelipeds of slightly greater relative length, the male differs from the female in being much more sharply granular.

Numerous males and egg-laden females, from different parts of the Malabar Coast in 26–30 fathoms, from the North Maldive Atoll in 15–30 fms., and from Mergui in 40 fms.

I have thought it justifiable to change the name of this species from *granulosa* to *pustulilabris*, as Miers, 'Challenger' Brachyura (1886) p. 317 has already used the very similar name *granulata* for a species belonging to this genus as here defined.

36. *Randallia glans*, n. sp.

Carapace globular, usually in the male smooth and polished to the naked eye though closely punctate-granular under the lens, in the female densely covered with vesicular granules that are often visible without any magnification: all its borders smooth and full, and except for a broad and shallow notch in the antero-lateral border, between the branchial and hepatic regions, its regions are not in any way defined.

Front narrow, broadly bidentate, the tips of the teeth somewhat produced and bent outwards: its base is separated from the rest of the carapace by an indistinct groove.

External maxillipeds smooth and polished to the naked eye in the male, somewhat more granular in the female—just like the carapace.

Chelipeds stout: in the male a little less than twice the length of the carapace, everywhere very densely granular, the granules being vesicular and being plainly visible without a lens on the arm at any rate: fingers stout, as long as the hand, which is between $\frac{1}{2}$ and $\frac{2}{5}$ the length of the carapace. Legs smooth: dactyli with a few hairs.

In the male the 3rd–5th abdominal terga are fused but are independently recognizable, and the 6th has a strong terminal denticle; in the female the 3rd–6th are fused.

The carapace of the adult male is 6 millim. in either diameter, that of the ovigerous female is 7·5 millim. long and 8 millim. broad.

Andaman Sea, about 50 fms.

This species is closely related to *R. pustulilabris*.

37. *Randallia lamellidentata*, Wood-Mason.

Randallia lamellidentata, Wood-Mason, Illustrations of the Zoology of the 'Investigator' Crustacea, pl. v. figs. 5, 5*a*, 5*b*: Alcock, Ann. Mag. Nat. Hist. May, 1894, p. 404.

Carapace rhomboidal with the angles rounded off—subcircular; its surface behind the front covered with unequal-sized rather scattered pustulous tubercles; its regions well defined by grooves of some depth.

Front bluntly bidentate. On the antero-lateral margin are three broad lamelliform teeth, the front one of which is on the pterygostomian ridge (which as usual forms the front part of the antero-lateral margin), and there is a fourth similar tooth at the junction of the antero-lateral and postero-lateral margins. The postero-lateral margins are full and the pustulous tubercles extend on to them.

The short posterior margin is elegantly bilobed, with a few pearly granules round the lobes, and is overhung by the tip of the horizontal spine in which the intestinal region culminates.

The ventral surface of the carapace, the thoracic sterna, abdominal

terga (in the male) and external maxillipeds are all granular, the granules above the base of the chelipeds being enlarged and pearly.

The chelipeds in the male are about two-thirds as long again as the carapace, and are massive and granular: at the distal end of the outer edge of the somewhat trigonal arm the granules are enlarged and almost spiniform, as are also one or two at the distal end of the outer surface of the wrist. The hand is not much longer than broad and hardly one-third the length of the carapace; its outer edge is in the form of a remarkably thin and deep crest: the fingers are stout and rather longer than the hand, their outer (non-opposed) edges are cristiform.

The legs are granular, the granules on the dorsum of the propodites carpopodites and distal end of the meropodites being spiniform, as also on the outer surface of the ischium and merus of the last pair: the dactyli are hairy.

The 3rd–6th abdominal terga of the male are fused but are all very distinctly and independently recognizable, the 6th has a terminal denticle.

The largest male, dredged in the Andaman Sea at 350 fms., has the carapace between 16 and 17 millim. long and 18 millim. broad (without spines).

38. *Randallia pustulosa*, Wood-Mason.

Randallia pustulosa, Wood-Mason, Ann. Mag. Nat. Hist. March, 1891, pp. 266 and 267, and Illustrations of the Zoology of the 'Investigator' Crustacea, pl. v. fig. 4.

Carapace subcircular, subspherical; covered with unequally large pustulous tubercles the surface of which, like the surface between them, is finely and closely granular under the lens; all the regions are well defined by broad grooves.

The front is narrow and broadly bidentate. The lateral margins are full and inflated, and carry in the adult a series of tubercles, in the young a series of blunt spines: in the antero-lateral margin, between the hepatic and branchial regions, is a conspicuous notch, which corresponds with a groove or depression in the pterygostomian face of the carapace.

The short posterior border has a spine or dentiform lobe at either end, and is overhung by the long spine in which the tumid intestinal region culminates.

The whole under surface is densely granular in the young male, but in the female the fused 4th–6th abdominal terga and the inner half of the ischium of the external maxillipeds are smooth.

The chelipeds in the adult female and young male (adult male unknown) are twice the length of the carapace and are everywhere

finely granular. The hand is subcylindrical and elongate, being half as long as the carapace; the fingers are stout and about as long as the hand, they are finely denticulate, with enlarged denticles at regular distant intervals.

The legs are stoutish and, to the naked eye, smooth: the dactyli are fringed with hairs.

In the (young) male the 3rd–6th abdominal terga are fused but without any obliteration of sutures: in the adult female the 4th–6th are fused and the sutures obliterated.

Carapace of an adult female about 31 millim. in either diameter.

Loc. Andaman Sea, 240–220 fms., and 250 fms., Laccadive Sea, 406 fms.

In the young the carapace is quite spherical, with its edges spiny and its surface closely and crisply granular—the young, in short, has a very strong general resemblance to the adult of *R. pustulilabris*.

In the adult female the brood-pouch communicates with the branchial chambers on either side by means of a foramen, as in *Parilia*.

39. *Randallia eburnea*, n. sp.

Carapace subcircular, convex, subspherical, perfectly smooth to the naked eye though closely covered with vesicular granules under the lens; its regions, except the intestinal, hardly defined.

The front is narrow, and is broadly bidentate; the edge of the buccal cavern is more prominent beyond it than in any of the other species. Between the convex subhepatic border and the branchial border is a broad notch: near the middle of the branchial border is a rounded deflexed tooth: the antero-lateral margin from the front to this tooth is finely denticulate.

The fissures in the outer wall of the orbit are very distinct.

The posterior margin is elegantly three lobed, the lateral lobes being broad and semicircular, the middle lobe being narrower: all three are laminar.

The external maxillipeds are granular and pubescent distally.

The chelipeds are longer and more slender than in any of the other species, being a little more than $2\frac{1}{2}$ times the length of the carapace: they are perfectly smooth to the naked eye though closely granular under the lens, the granules on the arms being vesicular. The hands are subcylindrical and about two-thirds the length of the carapace: the fingers are stout and between $\frac{2}{3}$ and $\frac{3}{4}$ the length of the hand, their opposed edges are finely denticulate, with enlarged denticles at distant regular intervals. Legs smooth, the dactyli with a few fine hairs at tip only.

Although the 3rd–5th abdominal terga are fused they are all three independently recognizable.

Carapace of (apparently adult) male 14 millim. in either diameter.

Loc. Off Laccadive Islands, 30 fms.

Parilia, Wood-Mason.

Parilia, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 264.

Carapace strongly convex, especially posteriorly, somewhat oval transversely, with three spines on the posterior margin; the surface finely granular, the regions fairly well-defined.

The front is narrow and bidentate, and the epistome projects well beyond it,—the epistome being, for an Oxystome, deep—as in *Randallia* and *Nucia*.

The eyes are small, and the orbits imperfect, for not only have they two fissures (not mere sutures) in the roof, and a broad fissure in the outer wall, and a broad gap communicating with the antennary and antennulary fossæ, but their upper-outer wall is deeply emarginate.

The antennules fold a little obliquely. The antennæ are distinct, and stand in the gap at the inner canthus of the orbit, which they do not nearly fill.

The buccal cavern is considerably broader than long, owing to the enormous width of the afferent branchial channels and of the foliaceous expansion of the exopodite that covers them: the outer edge of the latter is strongly curved: the triangular merus of the endognath is very nearly as long as the ischium, measured along the inner edge.

The chelipeds in the adult male are several times the length of the carapace, and are slender, though more massive than the legs: the hands are several times the length of the stoutish fingers.

The abdomen in the male consists of five distinct pieces: in the female it consists of seven, but the 4th, 5th and 6th are not separately movable.

Branchial chambers greatly inflated, especially posteriorly: branchiæ large, and six in number on either side. [Brood-pouch of the female very large and communicating with the branchial chamber on either side, at base, by a foramen.]

40. *Parilia alcockii*, Wood-Mason.

Parilia alcockii, Wood-Mason, Ann. Mag. Nat. Hist., March 1891, p. 264, and Ill. Zool. 'Investigator,' Crust. pl. v. figs. 3, 3*a* ♀: Alcock and Anderson, J. A. S. B. Vol. LXIII. pt. 2, 1894, p. 177.

Carapace about seven-eights as long as broad, transversely oval,

but with the anterior margin—between the outer angles of the afferent branchial channels—perfectly straight.

The antero-lateral margin is broadly indented at the junction of the hepatic and branchial regions, and bears four denticles; and there are three denticles on the posterior margin, the middle one of which is the smallest: just above the posterior margin is another transverse row of three denticles,—one in the middle of the intestinal region and one on the posterior wall of the branchial region on either side.

The carapace is strongly convex, the convexity gradually increasing from before backwards and then suddenly dropping, like a simian cranium, which in profile it much resembles: the surface is everywhere finely granular.

The regions of the carapace are well delimited by broad shallow grooves and lines of dimples, the branchial regions each forming an enormous tumid expanse. A slightly raised ridge traverses the carapace, in the middle line, from the base of the front to the intestinal denticle.

The front is broadly bilobed, each lobe being convex dorsally and acuminate: beyond it in a dorsal view is seen the epistome and the whole length of the edge of the buccal cavern.

The surface of the external maxillipeds and the ventral surface of the carapace are finely granular, but the sternum and the greater part of the abdomen are smooth. In the middle of the sternum of the female, between the genital openings, is an erect spine.

The external maxillipeds have a narrow triangular endopodite, the merus of which is strongly curved upwards towards the front; and a foliaceous exopodite, which is much shorter than the endopodite, and which is semicircular in shape and two-thirds as broad as long—broader even than in *Philyra globosa*, Fabr.

The chelipeds as in *Myra fugax*, vary according to age and sex: in the adult male they are $4\frac{1}{2}$ times, in the female and young male $2\frac{1}{2}$ times, the length of the carapace, and are only about twice as massive as the legs: their surface up to nearly the end of the hand is finely scabrous. The arm is cylindrical: the hand in the female is cylindrical, but in the male somewhat clavate. The hand in the male is more than 3 times, in the female only twice the length of the fingers: the fingers are stout, gently curved in the female, somewhat sinuous in the adult male, and their opposed edges are almost edentulous.

The legs in the male are shorter than the arm; in the female they are a little longer than the arm: they are cylindrical, and finely scabrous on the dorsal surface: the dactyli are obtusely pointed, and have both their edges closely fringed with longish stiff hairs.

Colours in spirit rusty reddish.

The carapace of the average adult male is 50 millim. long and 56 millim. broad, of the adult female 40 millim. long and 48 millim. broad.

Fairly common on soft muddy bottoms along the east coast of India between 70 and 250 fathoms.

In the Indian Museum collection are 96 specimens of both sexes and all ages.

Myra, Leach.

Myra, Leach, Zool. Miscell. III. p. 23.

Myra, Milne-Edwards, Hist. Nat. Crust. II. 125.

Myra, Bell, Trans. Linn. Soc. Vol. XXI, 1855, p. 296, and Cat. Leucos. Brit. Mus. p. 12.

Myra, Miers, 'Challenger' Brachyura, p. 312.

? *Myropsis*, Stimpson, Bull. Mus. Comp. Zool. Vol. II. p. 156.

Carapace ovoid (or globular in *Myropsis* and in the *young* of most Indian species of *Myra*), terminating posteriorly in three spines,—two on, and one in the middle line immediately above, the posterior border. (But in *Myropsis* and in the young of several species of *Myra* there is a pair of additional spines,—one on either postero-lateral border just above the last pair of legs). The surface of the carapace is either smooth or granular, never nodular or eroded, and resembles that of *Leucosia* in not having all the regions demarcated, at any rate in the adult.

The front is well delimited from the carapace, and although the dentiform prolongations of the septa of the branchial channels may sometimes project beyond it, yet the whole of the edge of the buccal cavern is never in the adult seen beyond it in a dorsal view.

The hepatic region—the side-wall of which commonly forms a distinct facet—is generally separated from the branchial region by a broad notch in the antero-lateral margin, this being continuous with a depression in the pterygostomian face of the carapace and with a longitudinal groove in the side-wall of the carapace,—the whole foreshadowing the thoracic sinus of *Leucosia* (? in *Myropsis*).

The orbits are deep, and although the upper edge is a little emarginate, the retracted eye is completely concealed: the three sutures in the roof and outer wall are very distinct: as in *Leucosia* the floor practically coincides with the roof of the buccal cavern, as regards its edge at any rate.

The antennæ are loosely lodged in a gap at the inner canthus of the orbit. The antennules fold obliquely.

The buccal cavern is elongate: the acutely-triangular merus of

the external maxillipeds is not much more than half the length of the ischium measured along the inner edge: the 2nd segment of the exognath generally has the outer edge elegantly curved, but is not dilated except a little at the base.

The chelipeds though much more massive than the legs, and rather more massive than those of *Ilia*, *Arcania* and their immediate allies, are not nearly so massive as those of *Leucosia*, *Philyra*, etc. In some species at any rate they vary much in length according to age and sex, but they are seldom less, and are often more, than twice the length of the carapace. The fingers are stout and vary in length, being sometimes a little longer than, but in the adult males of one species only half the length of, the hand.

The abdomen of the male usually consists of 4 pieces, that of the female of 5.

The species of this genus are often difficult to discriminate owing to the changes that they undergo in growth. The following key will, it is believed, serve for the determination of adult forms.

Key to the Indian species of Myra.

I. Carapace broadly oval (longitudinally), with a broad notch in the antero-lateral margin between the hepatic and branchial regions:—

1. Side-wall of hepatic region forming a distinct facet, behind which the lateral margins of the carapace are defined by a beaded line: spines of the posterior margin more or less acute: fingers either shorter or hardly longer than the hand:—

i. Spines of the posterior margin long and acute: carapace finely granular—the granules hardly visible to the naked eye: chelipeds slender (in the adult male nearly thrice the length of the carapace): hand long (in the adult male often nearly twice the length of the fingers, and about two-thirds the length of the carapace) ... *M. fugax.*

ii. Spines of the posterior margin short, the middle one acute,

those on either side dentiform: carapace crisply granular, the granules of good size: chelipeds stoutish, not quite twice the length of the carapace even in the adult male: hand short:—

a. Front not projecting beyond the dentiform ends of the walls of the branchial channels: hand about half length of carapace: fingers about two-thirds length of hand ..... *M. affinis.*

b. Front shaped much as in *Leucosia*, projecting well beyond the free edge of the branchial channels: hand hardly two-fifths the length of the carapace: fingers as long as the hand ..... *M. brevimana.*

2. Side wall of hepatic regions convex, not distinctly facetted in the adult: lateral margins of the carapace full, and not defined by any beaded line: armature of the posterior margin consisting of three petaloid lobules: fingers longer than the hand ..... *M. darnleyensis.*

[II. Carapace subcircular, with five marginal spines and spinules at its posterior end ..... *M. pentacantha.* (probably the young of *M. fugax*)].

III. Carapace narrowly and acutely oval (longitudinally) its shape recalling that of *Raninoides*, without any marked notch between the hepatic and branchial regions ..... *M. elegans.*

41. *Myra fugax*, (Fabr.)

Cancellus anatum tertius, Rumph, Amboin. Rariteitk. I. 27, pl. x. fig. C.
Cancer punctatus, Herbst, Krabben, I. ii. 89, pl. ii. figs. 15, 16.

Leucosia fugax, Fabricius, Ent. Syst. Suppl. p. 351: Bosc, Hist. Nat. Crust. I. 236: Latreille, Hist. Nat. Crust. et Ins. VI. 119, pl. *l.* figs. 1, 2.

Myra fugax, Leach, Zool. Miscell. III. p. 24: Desmarest, Consid. Crust. p. 169, pl. xxviii. fig. 2: Milne Edwards, in Cuvier, Règne Animal, Crust. pl. xxv. fig. 3, and Hist. Nat. Crust. II. 126: De Haan, Faun. Japon. Crust. p. 134, pl. xxxiii. fig. 1: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 296, and Cat. Leucos. Brit. Mus. p. 12: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160: A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 45: Hilgendorf, MB. Ak. Berl. 1878, p. 811: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 48 (*gastric teeth*): Richters, in Möbius Meeresf. Maurit. p. 157: Miers, P. Z. S. 1884, pp. 10, 13, and 'Challenger' Brachyura p. 313: [Cano, Boll. Soc. Nat. Napoli, III. 1889, p. 253]: Müller, Verh. Ges. Basel, VIII. 1886, p 472: Ortmann, Zool. Jahrbuch., Syst., &c, VI. 1892, p. 581: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402. (Adult).

Myra carinata, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 297, pl. xxxii. fig. 3, and Cat. Leucos. Brit. Mus. p. 13: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 50, and Cat. Austral. Crust. p. 121: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 316, and Zoology H. M. S. 'Alert' pp. 184, 250: Sluiter, Tijds. Nederl. Ind. XL. 1881, p. 160: Müller, Verh. Ges. Basel, VIII. 1886, p. 472: A. O. Walker, Journ. Linn. Soc., Zool., XX. p. 111. (Non-adult).

Myra coalita, Hilgendorf, MB. Ak. Berl. 1878, p. 812, pl. i. figs. 6 and 7: [Cano, Boll. Soc. Nat. Napol. III. 1889, p. 253]. (Non-adult).

Myra dubia, Miers, P. Z. S. 1879, pp. 20, 42.

Myra fugax, var. *coalita*, Ortmann, Zool. Jahrbuch., Syst., &c., VI. 1892, p. 582.

Carapace, in the adult, ovoidal, with 3 sharp, usually recurved, spines—one at either extremity of the posterior margin, and one very long one in the middle line just above the posterior margin. On the surface of the carapace are (1) some scattered punctiform granules, almost invisible to the naked eye in the adult (except on the basal half of the median posterior spine where they are always large and numerous), and (2) a longitudinal median carina, almost or quite obsolete in the adult. The regions of the carapace are not well defined.

The front is broadly bidentate, and is prominently convex dorsally, but projects so little beyond the edge of the buccal cavern that the spiniform angles of the branchial channels and the tips of the external maxillipeds can be seen beyond it in a dorsal view: it and the neighbouring parts are usually somewhat pubescent.

Behind the tip of the front the antero-lateral boundary of the carapace is formed by the obliquely-facetted side-wall of the sub-hepatic region, the facet being bounded above and below by beaded lines on both of which, near their posterior end, is a tubercle or tooth: the surface of the facet is quite smooth.

Behind the hepatic facet, between it and the branchial region, is a very well defined notch corresponding with a depression on the pterygostomian face, this again being in continuity with a well-cut longitudinal groove (quite independent of the epimeral suture) that traverses

the side-wall of the carapace just above the somewhat thickened epimeral edge,—the whole foreshadowing the thoracic sinus of *Leucosia*.

Behind this notch the lateral border of the carapace is defined by a finely beaded line, the first few beads being sometimes, in non-adults, somewhat dentiform.

The external maxillipeds are granular and hairy distally, and in the female are hairy all along their apposed edges.

The chelipeds vary a good deal according to age and sex, but are always rather slender. In the adult male they are from $2\frac{3}{4}$ to $3\frac{1}{4}$ times the length of the carapace (without spine), in the adult female a little over twice. The cylindrical arm has the proximal half to three-quarters closely covered on all but its under surface with enlarged vesicular granules. The hand though slightly broadened at base, is of an elongate rather slender form: in the adult male it is about $\frac{2}{3}$ the length of the carapace (without spine), in the adult female half or a little more than half. The fingers in the adult male are from $\frac{5}{8}$ to $\frac{1}{2}$, in the adult female about $\frac{2}{3}$, the length of the hand: they are gently curved, a little bent inwards, and somewhat slender, and their opposed edges meet throughout and are finely denticulate, with larger denticles at regular rather distant intervals.

The legs are slender and not, or hardly, longer than the arm; their dactylus is narrowly lanceolate and fringed with longish stiffish hairs, as is also the dorsal edge of the propodite.

On the long penultimate piece of the male abdomen is a terminal granule.

Colours in spirit: pinkish flesh-colour, the chelipeds and legs coppery, the front and branchial regions often with a bluish tinge.

The largest adult male in the Indian Museum collection has the carapace 28 millim. long (without spine) and 23 millim. broad.

Found on both coasts of the Peninsula, at the Andamans, and in the Persian Gulf.

In the Indian Museum there are 57 specimens, including numerous adults of both sexes.

[*Myra pentacantha*, n. sp. ?

Most probably the young of M. fugax.

Differs from *Myra fugax* Fabr. in the following characters:—

(1) the carapace is almost circular, and is somewhat depressed, except in the middle line where it is strongly carinated:

(2) the front is thickly pubescent, and the whole of the free edge of the buccal cavern is visible beyond it in a dorsal view:

(3) the intestinal region is well defined and rather tumid, and is

surmounted in the middle line by a raised cluster of granules, terminating, but discontinuous with, the carina of the carapace:

(4) in addition to the 3 spines on the posterior margin of the carapace there is a spine or spinule on either postero-lateral margin above the last pair of legs:

(5) on the antero-lateral margin, immediately behind the branchio-hepatic notch, are several denticles.

The chelipeds are not quite twice the length of the carapace: they are slender, and their constituent pieces have the same proportions as in the adult female of *M. fugax*.

The carapace of an average specimen is 8·5 millim. long and 8 millim. broad.

In the Indian Museum are 29 specimens from both coasts of the peninsula. Commonest at about 25 fathoms.

I regard these as the very young of *M. fugax* first because among 57 specimens of that species in the Indian Museum there is not a single very young one, and secondly because a fine large adult male of that species in our collection has the additional spine well developed on one side. Again it is suggestive that although *M. pentacantha* appears to be a common enough form, it is never found as an adult.]

42. *Myra affinis*, Bell.

Myra affinis, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 296, pl. xxxii. fig. 2, and Cat. Leucos. Brit. Mus., p. 12: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 160: Haswell, P. L. S. N. S. Wales, IV. 1879, p. 50, and Cat. Austral. Crust., p 121: Miers, Zool. H. M. S. 'Alert' pp. 184, 150, and 'Challenger' Brachyura, p. 315: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1890, p. 111.

Myra mamillaris, Miers (*nec* Bell), Miers, Trans. Linn. Soc. (2) I. 1875–79 (1877) p. 239, pl. xxxviii. figs. 25–27, and 'Challenger' Brachyura, p. 315.

Myra subgranulata, Kossmann, Reise roth. Meer. Crust., p. 65, pl. i. fig. 7, and Archiv. für Naturg. XLIV. 1878, p. 256.

? *Myra australis*, Haswell, Proc. Linn. Soc. N. S. Wales, IV. 1879, pp 50 and 404, pl. v. fig. 3, and Cat. Austral. Crust., p. 122: Miers, Zool. H. M. S. 'Alert' pp. 184, 251, and 'Challenger' Brachyura, p. 315: A. O. Walker, Journ. Linn. Soc. Zool., XX. 1890, p. 111: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402.

Myra punctata, de Man, Journ. Linn. Soc., Zool., XXII. 1878, p. 205 (*nec synon*).

Differs from *Myra fugax*, adult males being compared, in the following characters:—

(1) the carapace, including the surface of the sub-hepatic facet, is covered with crisp granules, all very plainly visible to the naked eye; its longitudinal median carina is persistent and granular; its posterior marginal spines are shorter and blunter, the middle one being sharp and recurved, the lateral ones dentiform:

(2) the chelipeds are stouter and shorter, being a little less than twice the length of the carapace (without spine); the hand especially is stouter and shorter, being hardly half the length of the carapace; the fingers are about $\frac{2}{3}$ the length of the hand:

(3) the long penultimate piece of the male abdomen carries a strong terminal tooth.

Colours in spirit: some reddish or orange markings on the carapace, and some broad orange-reddish cross-bands on the chelipeds.

The largest adult male in the Indian Museum collection has the carapace 17 millim. long and 15 millim. broad.

In the young the intestinal region is distinctly delimited, rather tumid, and is surmounted by a raised cluster of granules terminating, but discontinuous with, the median carina of the carapace.

In the Indian Museum collection are 16 specimens from Arakan, Mergui, Andamans, Ganjam coast, and the Persian Gulf.

The specimens here included comprise (1) adult forms that answer to Bell's descriptions and figures of *M. affinis* and are readily distinguishable from *M. fugax* (*a*) by the relative stoutness and shortness of the chelipeds and hands and (*b*) by the shortness and coarseness of the spines, and (2) half-grown forms that correspond with Haswell's figure of *M. australis*, and Miers' figures of *M. mamillaris* (*loc. cit.*) which Miers in his work on the 'Challenger' Brachyura refers to *M. australis*. Although Haswell's figure and description hardly correspond—*e.g.*, the fingers are described as being about half the length of the hand, but are figured as nearly equal to the hand in length—I cannot but think that his species represents the immature form of *M. affinis*.

In very young specimens there is a denticle or enlarged granule on either postero-lateral margin above the last pair of legs.

43. *Myra brevimana*, n. sp.

Differs from *M. fugax*, a large series of fully adult males and ovigerous females being compared, in the following characters:—

(1) the carapace is much more convex, being ovoid in the male, subglobular in the female; its surface, including the surface of the subhepatic facet, is crisply granular and its longitudinal median carina is persistent and granular, as in *M. affinis;* the posterior marginal spines are as in *M. affinis*, the middle one being short stout acute and recurved, the lateral ones being dentiform:

(2) the front is much more deeply and acutely bidentate, and otherwise is shaped much as in *Leucosia*, being strongly convex, being delimited from the hepatic regions on either side by a hollow, being well recurved upwards, and projecting so far that no part whatever of

the buccal frame or of the external maxillipeds can be seen in a dorsal view even in the deep incision between the frontal teeth:

(3) the tooth on the posterior part of the upper of the two lines that defines the hepatic facet is almost as large and prominent as that on the lower:

(4) the chelipeds are quite similar in both sexes, and are stout, especially the hand; they are just under twice the length of the carapace (without spine). The hand is hardly two-fifths the length of the carapace (without spine), is more than half as broad as long, and is somewhat inflated; the fingers are as long as the hand, the dactylus being plainly longer than the outer border of the hand:

(5) on the long penultimate piece of the male abdomen is a strong terminal tooth.

Colours in spirit: regions of carapace defined by broad orange-red markings, some broad orange-red cross-bands on chelipeds, one of which occupies the basal half or three-fourths of the fingers.

Carapace in the adult male 16 millim. long and 14 millim. broad, in the adult female 20 millim. long and 18 millim. broad.

In the Indian Museum are 34 specimens from Arakan, Mergui, Ganjam, and Ceylon, usually at depths of about 30 fathoms.

In the young the intestinal region is well defined and tumid, and is surmounted by a raised cluster of granules in a line with the median longitudinal carina.

The prominent front, the stout chelipeds, and the short inflated hands are characters by which this species is easily recognized.

44. *Myra darnleyensis*, Haswell.

Myra darnleyensis, Haswell, Proc. Linn. Soc., N. S. Wales, IV. 1879, p. 52, pl. v. fig. 4, and Cat. Austral. Crust. p. 122: Miers, 'Challenger' Brachyura, p. 316.

Carapace sub-piriform, globous dorsally, the lateral margins full and inflated and not defined by any beaded line; the surface very finely and closely granular (under the lens); the intestinal region fairly well defined, as are also the branchial regions posteriorly.

The three processes on the posterior margin are not spines, but broadly-laminar petaloid lobes.

The front is prominent, but the dentiform ends of the walls of the branchial canals can be seen beyond it in a dorsal view: it is deeply channelled in the middle line, dorsally, and has a fluted appearance: the outer wall of the orbit has the same elegantly fluted appearance, owing to the depth of the sutures and the convexity of the surfaces between the sutures.

Behind the front the side-wall of the hepatic regions is full and

convex, not flattened and distinctly facetted as it is in other species : it bears, however, a strong mammillary tubercle. As in the other species, there is a well-defined notch in the antero-lateral margin between the hepatic and branchial regions—the notch as usual being in continuity with a crease in the pterygostomian face, and this with a groove in the lateral wall of the carapace.

The external maxillipeds are granular and hairy distally, being alike in both sexes.

The chelipeds are alike in both sexes and are about twice the length of the carapace : all the surfaces of the arm in the greater part of its extent are vesicular-granular, but the granules are only just visible to the naked eye. The hand is short, about one-third the length of the carapace (without spine), and is somewhat inflated. The fingers are markedly longer than the hand, the dactylus being about half again as long as the outer border of the hand.

The long penultimate piece of the abdomen of the male carries a stout terminal denticle.

Colours in spirit much as in *M. brevimana*, the regions of the carapace being defined by broadish orange-red markings, and the chelipeds having some broad cross-bands of the same colour, but these never involve the fingers, which are white.

In the male the carapace is 13 millim. long (without spine) and 11 millim. broad, in the female 15 millim. long and 13 millim. broad.

In the Indian Museum are 52 specimens, including adult males and ovigerous females, from the Andamans, Maldives, Palk Straits, and from off Ceylon 34 fms.

In many adult females, as in most young, there is in the middle of the carapace a cruciform constellation of 5 enlarged bead-like granules or denticles. In the young also the side wall of the hepatic region is not so much inflated and even shows traces of flattening, while the tumid intestinal region is surmounted by an enlarged granule, and on either postero-lateral margin (in the very young), just above the last pair of legs, is a denticle or enlarged granule.

45. *Myra elegans*, Bell.

Myra elegans, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 297, pl. xxxii. fig. 4, and Cat. Leucos. Brit. Mus. p. 13.

Carapace elongate-oval tapering to a long acute spine at the posterior margin, half again as long as broad without the spine, nearly twice as long as broad with the spine. On either side of the spine is a spinule situated at either extreme of the short posterior margin, and a little in advance of these, on either postero-lateral margin, just above the last pair of legs, is sometimes a sharp denticle.

The carapace is traversed longitudinally, from the middle of the gastric region, by a broadish granular carina, and there is an elongate patch of granules along the middle of either branchial region and a patch round and on the big posterior spine; otherwise the carapace is smooth.

The front is broadly bilobulate, each semi-circular lobule having a knife-edge, and although it projects beyond the margin of all parts of the buccal cavern, yet the hairy tips of the external maxillipeds can be seen beyond it in a dorsal view.

Behind the front the side wall of either sub-hepatic region forms a not very well marked hairy facet, behind which there is no well marked marginal notch as there is in the other species. The lateral margins of the carapace are well defined and beaded throughout.

The chelipeds are nearly similar in both sexes, being slender and short—only about $1\frac{1}{3}$ times the length of the carapace (without spine): the upper surfaces of the cylindrical arm are covered with enlarged vesicular granules in the greater part of their extent, and the under surface at base only: the hand is short, hardly a quarter the length of the carapace (without spine): the fingers are almost one-fourth longer than the hand.

The legs are compressed, especially the carpopodites and propodites, the latter and the dactyli having hairy edges.

The long penultimate piece of the abdomen of the male has a terminal denticle.

The largest male in the Indian Museum has the carapace 12 millim. long and 8 millim. broad: in an apparently adult female the carapace is 15·5 millim. long and 10·5 millim. broad.

A young and two apparently adult males and an adult female from a muddy bottom, in 12 fms., off the Madras coast, and a young male from off the Arakan coast 13 fms., are in the Indian Museum. In the last mentioned the wrist and hand are elegantly fluted with lines of raised granules.

Although our female is not laden with eggs, I conclude that it is adult because it has the wide deep brood-chamber with the broad convex abdominal lid so familiarly found in the adult females of the *Leucosidæ*. Moreover the carapace is stained and worn as if it had not been renewed for a long time. *Myra elegans* is certainly not the young of any other Indian species.

Leucosia, Fabr.

Leucosia, Fabricius, Ent. Syst. Suppl., p. 349.
Leucosia, Milne Edwards, Hist. Nat. Crust. II. 121.

Leucosia, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 281, and Cat. Leucos. Brit. Mus., p. 5.

Leucosia, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 39.

Leucosia, Miers, 'Challenger' Brachyura, p. 322.

The whole exo-skeleton is of the consistence and appearance of glazed porcelain.

Carapace extremely convex, sub-circular or subrhomboidal to hexagonal in outline, perfectly smooth, with none of the regions—except sometimes the hepatic—defined: in front of the hepatic regions it is produced to form a sort of upturned snout, underneath the tip of which are found the minute eyes sunk in deep round complete orbits, the obliquely-folding antennules, and the minute antennæ lying below the antennules.

The lateral epibranchial angles of the carapace form on either side a distinct lobe, which is bent downwards towards the base of the chelipeds to form the eave of a deep sinuous depression in the side-wall of the carapace, known as the thoracic sinus.

The true postero-lateral margin of the carapace is ill-defined posteriorly, and the epimeral edge of the carapace—which practically takes the place of most of the postero-lateral margin—is greatly thickened and elegantly milled. These epimeral edges on either side are continuous with a finely-beaded crest that forms the posterior margin of the dorsum of the carapace; and below this posterior margin the carapace ends in a deflexed posterior wall.

The buccal cavern is elongate-triangular, and the front part of its side walls are coincident with the sides of the snout-like front of the carapace: the acutely-triangular merus of the external maxillipeds is about as long as the ischium, and the outer margin of the exognath is almost straight.

The chelipeds are symmetrical and, relatively to the legs, very massive; they are a little longer in the male than in the female, but are very rarely more than half again as long as the carapace: the margins and certain parts of the surfaces of the arms are ornamented with large polished pearly tubercles: the hands are usually short and broad and little longer than the fingers. The true legs are small.

The abdomen of the male consists usually of 4 pieces, but the two large middle pieces (which are formed of 5 terga) are sometimes fused, into one: the abdomen of the female also consists of 4 pieces usually, but the large oval third piece (which is formed of 4 terga) is sometimes fused with the second piece.

The so-called thoracic sinus of *Leucosia* is simply an invagination of the after part of the pterygostomian region and of the side-wall of the carapace, as may be seen by comparing cleaned carapaces with those of other Leucosines.

The invagination seems to be chiefly due to the pushing up of the epimeral margin against the resistance of the vault of the carapace — a pushing up which may be inferred from the position of what remains of the "epimeral suture."

The origin of the thoracic sinus from such a simple invagination is very apparent in the isolated carapace of *Leucosia unidentata*. Here, viewed from the inside of the carapace, the thoracic sinus is seen as the convexity of a pocket; and, viewed from the outside, the mouth of the sinus shows as a ring of large granules or puckers resulting from invagination.

Key to the Indian species of Leucosia.

A. Normal genera: free edge of front projecting beyond the epistome: hands not foliaceous:—

I. Carapace conspicuously longer than broad, bluntly rhomboidal, quite devoid of definite pubescence, the thickened epimeral edge never visible in all its extent, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes: front never ending in three sharp horizontal prongs: the thoracic sinus always defined in some part of its extent by large granules visible to the naked eye: no extensive growth of hair, or definite patches of spongy pubescence at the base of the upper surface of the arm: meropodites of legs subcylindrical: abdomen in both sexes consisting of 4 pieces:—

1. Outer edge of hand never carinate: front dorsally convex in all its extent: posterior margin of carapace, in the adult, usually gently convex, with its external angles not defined:—

i. True postero-lateral margin of carapace beaded as far as the level of the base of the last pair of legs: ventral surface of ischium of external maxillipeds of female almost flat—never broadly carinate:—.

a. A loop of large granules between the base of the chelipeds and the margin of the carapace: two small red and white ocelli on either side of the gastric region ..... *L. unidentata.*

b. A single row of large granules between the base of the chelipeds and the margin of the carapace, and above it a second row of very small granules running into the puckered edge of an almost circular bight in the pterygostomian region: no ocelli *L. obtusifrons.*

ii. True postero-lateral margin of carapace beaded only up to the level of the base of the first pair of true legs: a single row of large granules between the base of the chelipeds and the margin of the carapace:—

a. Carapace, excluding the whole front, broader than long, its posterior margin gently convex:—

aa. Thoracic sinus deep, the convex edge of the pterygostomian region, which defines the sinus

anteriorly, being finely granular: front ending in a triangular projecting beak: ventral surface of ischium of external maxillipeds of female broadly carinate up to a stout terminal tooth:—

a. Hepatic regions each forming a strong mammary bulge, dorsally, quite independent of the general convexity of the carapace: meropodites of true ambulatory legs perfectly smooth ..... *L. longifrons.*

β. Convexities of hepatic regions hardly distinguishable, dorsally, from the general convexity of the carapace: meropodites of true ambulatory legs with some longitudinal granulation:—

*a*1. Meropodites of legs with 3 rows of granules: inner edge of hand with several rows of granules: size under 25 millim..... *L. neocaledonica.*

*a*2. Meropodites of legs with a single row of granules: inner edge of hand with a single row of granules: size over 35 millim. *L. urania.*

bb. Thoracic sinus shallow, the convex edge of the pterygostomian region, which defines the sinus anteriorly, smooth and entire: edge of front sharply transverse, and sinuous: ventral surface of ischium of external maxillipeds of female non-carinate ..... *L. haswelli.*

b. Carapace, excluding the front, as long as broad, its posterior margin almost straight..... ..... *L. marmorea.*

2. Outer edge of hand raised into a sharp carina: posterior margin of carapace, in the adult, straight, with its external angles pronounced:—

i. Front dorsally concave in the middle line anteriorly:—

a. Size medium (carapace over 20 millim. long): thoracic sinus defined ventrally by a row of granules of which 3 or 4 are pearl-like ..... *L. pallida.*

b. Size small (carapace under 15 millim. long): thoracic sinus with at most three granules, two of which are very large and reniform or fungiform ... *L. whitmeei.*

ii. Front convex dorsally in all its extent, produced beyond the orbits into a broadly triangular point as in *L. longifrons* .... *L. corallicola.*

II. Carapace conspicuously longer than broad, sharply hexagonal, devoid of definite pubescence outside of the thoracic sinus, the thickened epimeral edge visible, dorsally, in all its extent when the carapace is held without any inclination straight in front of the observer's eyes: front ending in three sharp horizontal prongs: the thoracic sinus is filled with hair, and is not defined in any part of

its extent by granules visible to the naked eye: a definite patch of encrusting spongy pubescence at the basal end of the upper surface of the arm: meropodites of legs compressed: abdomen of the male consisting of 3 pieces, of the female of 4 pieces:—

1. Front much broader than long, distinctly trigonal, its sides merging in the antero-lateral borders of the carapace without any very abrupt transition: thoracic sinus deep, the edge of the pterygostomian region, which forms the anterior boundary of the sinus, convex and granular or milled: surface below the posterior margin of the dorsum of the carapace sharply granular:—

   i. Outer limb of the thoracic sinus not invading the antero-lateral margin of the carapace ..... *L. craniolaris.*

   ii. Outer limb of the thoracic sinus invading, and causing a marked emargination of, the antero-lateral border of the carapace ..... *L. vittata.*

2. Front about as long as broad, with the sides subparallel or, at any rate, forming an abrupt junction with the antero-lateral borders of the carapace: thoracic sinus shallow, the edge of the pterygostomian region, which forms the anterior boundary of the sinus, not strongly convex and not granular or milled:—

   i. The edge of the pterygostomian region that bounds the thoracic sinus almost straight: surface of carapace below the posterior margin of dorsum granular: inner surface of hand with two prominent sharp-cut rows of granules: size about 14 millim. ..... *L. rhomboidalis.*

   ii. Edge of the pterygostomian region a little convex: surface of carapace below posterior margin smooth: inner surface of hand smooth, or with a single row of obsolescent granules: size about 18 millim..... *L. pubescens.*

III. Carapace as broad as long, urn-shaped or broadly hexagonal, often with a strip of thick fur along the postero-lateral border, the thickened epimeral edge visible, dorsally, in all its extent when the carapace is held without any inclination straight in front of the observer's eyes: front obtuse: the thoracic sinus with or without granules: either a definite patch of spongy pubescence or a good deal of coarse hair at the basal end of the upper surface of the arm: meropodites of legs compressed: [abdomen of male consisting of 4 pieces, that of the female of 3, or if of 4, then the 3rd piece is again incompletely subdivided]: size very small, rarely 14 millim.:—

1. Lateral epibranchial angle and true postero-lateral border of the carapace with a sharply defined edging of thick fur:—

i. Outer edge of hand, if sharp, never distinctly carinate: front with the dorsal surface uniformly convex:—

a. Thoracic sinus defined ventrally by relatively large granules: hepatic region culminating, dorsally, in a granular eminence: arms covered with tubercles: hands subglobular: abdomen of female of 4 pieces, the large third piece incompletely subdivided into three ..... *L. whitei.*

b. Thoracic sinus not defined by granules: hepatic regions smooth and ill-defined: surfaces of arms not everywhere invested with tubercles, a definite patch of spongy pubescence at the basal end of the upper surface: hands of the ordinary form: abdomen of female formed of 3 pieces:—

aa. Four rows of tubercles—including those on the inner and outer margins—along the upper surface of the arm: fur and pubescence on carapace and chelipeds black (in spirit): carapace (in spirit) reticulated with bright brown ..... *L. margaritata.*

bb. Upper surface of arm with only a few tubercles besides those on the margins: fur and pubescence yellowish white: carapace covered with crimson spots ..... *L. hæmatosticta.*

ii. Outer edge of hand strongly carinate: front with the dorsal surface concave in the middle line giving a bilobed appearance ..... *L. elata.*

2. Lateral epibranchial angle and true postero-lateral border of the carapace devoid of fur:—

i. Front prominent beyond the hepatic regions: posterior border of the carapace not equal in length to half the greatest breadth of the carapace: thoracic sinus deep and sharply defined in front: hand hardly longer than the fingers..... *L. cumingii.*

ii. Front hardly prominent beyond the unusually strong convexity of the hepatic borders: length of the posterior border of the carapace more than half the greatest breadth of the carapace: hand about twice as long as the fingers ..... *L. sima.*

B. Peculiar genera:—

I. Free edge of front not projecting beyond the level of the epistome. Otherwise belonging to the *craniolaris* group ..... *L. truncata.*

II. Hands foliaceous: chelipeds shorter than the carapace: thoracic sinus ill defined. Otherwise belonging to the *longifrons* and *marmorea* group..... *L. phyllochira.*

46. *Leucosia unidentata*, De Haan.

Leucosia unidentata, DeHaan, Faun. Japon., Crust., p. 133, pl. xxxiii, fig. 3: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 44, and Cat. Austral. Crust. p. 118.

Leucosia obtusifrons var. *unidentata*, Ortmann, Zool. Jahrbucher, Syst. etc., VI. 1892, p. 585.

Carapace bluntly hexagonal or subcircular, about nine-tenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders sinuous, convex, faintly beaded anteriorly, strongly beaded posteriorly: its *true* postero-lateral border distinctly beaded or crenulate up to the level of the base of the *last* pair of legs: its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is not visible, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin short, gently curved, finely beaded, with the deflexed surface below it quite smooth.

The puckered mouth of the pterygostomian invagination—the thoracic sinus of Bell and subsequent authors—shows as a roughly 9-shaped loop of equal-sized large pearly granules situated between the base of the chelipeds and the strongly-pronounced lateral angle, or eave, of the carapace: the pterygostomian plate is deeply indented, transversely, in front of this loop of granules.

The convexities of the hepatic regions are an almost indistinguishable part of the general convexity of the carapace.

The front is prominent, dorsally convex, and truncate-triangular; its length is less than its breadth; its front edge is strongly deflexed and very faintly trilobed, the middle lobe being mucronate.

The ventral surface of the ischium of the external maxillipeds in the female, as in the male, is flat and smooth.

The chelipeds in the adult male are considerably more than half again as long as the carapace. The upper surface of the arm has two divergent longitudinal rows of pearly tubercles in addition to those that bound its inner and outer borders: these two rows start from a basal eminence formed of 7 or 8 smaller coalescent tubercles, and end near the distal quarter of the arm. The inner surface of the arm is completely covered with pearly tubercles of unequal size: the under surface is smooth except in its basal third, or half. The wrist is smooth except for two lines of bead-like granules bounding its inner surface,—one line dorsal in position, the other ventral. The hand and fingers together are as long as the arm. The hand is half again as long as broad, its narrow inner surface bears several rows of small bead-like granules the upper and lower of which are sharply defined and convergo

elegantly to the immobile finger, along which they are usually continued for some distance. The fingers are as long as the hand, and have their opposed edges crenulate throughout their extent.

The legs have stout subcylindrical meropodites (the trigonal origin of which, however, is shown by three longitudinal rows of fine granulation), inflated carpopodites, stout dorsally-sharp-edged propodites, and broadly lanceolate, or palmulate, dactyli.

The abdomen in both sexes consists of 4 distinct pieces, the third piece in the male bearing a strong tooth in the middle line.

Colours in spirit: carapace slate-grey with four small ocelli—two on either side of the gastric region: the ocelli have broad red circumferences and small white centres: the pearly tubercles of the upper surface of the arm have the base orange-red and the apex white: the fingers have a yellowish red base, and the legs are indefinitely banded with yellowish red.

The carapace of an adult of average size, of either sex, is about 30 millim. long and 27 millim. broad.

In India this species has been found only off the Malabar Coast at 45 fathoms. In the Museum collection are an adult male and female, and three half-grown females from the Malabar Coast, (and four adult females from Hongkong.)

47. *Leucosia obtusifrons*, De Haan.

Leucosia obtusifrons, De Haan, Faun. Japon. Crust. p. 133, pl. xxxiii. fig. 2: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: A. Ortmann, Zool. Jahrbucher, Syst. etc. VI. 1892, p. 585.

Differs from *L. unidentata*, De Haan, *only* in the following characters, adults of both sexes being compared:—

1. The puckered mouth of the pterygostomian invagination—or thoracic sinus—is still visible in all its extent as a long loop of granules lying between the base of the chelipeds and the eave of the carapace; but the granules of the dorsal limb of the loop are so small as to be only visible with a lens; those of the front convexity of the loop have—by a further infolding of the pterygostomian region—become partly welded together and cut off to form an almost isolated ring; while only those that form the ventral limb of the loop remain as large separate granules.

2. The two rows of tubercles on the upper surface of the arm are shorter, ending within the proximal half of the arm.

3. The chelipeds, in the adult male, are less than half again as long as the carapace.

4. The dactyli of the legs are narrowly lanceolate, not palmulate.

5. On either side of the gastric region are two white spots, instead of two red and white ocelli.

6. The body is somewhat smaller, the carapace in the average adult male measuring 25 by 23 millim., and in the average adult female 26 by 24 millim.

In the Museum Collection are 2 adult males, 4 egg-laden females, 2 young males, and a young female, from the Coromandel Coast.

The structural and colour differences hold good irrespective of age or sex, and I therefore think that De Haan's separation of this species from the preceding is justified.

48. *Leucosia longifrons*, De Haan.

? *Cancellus anatum secundus*, Rumph, Amboin. Rariteitkamer, I. 27, pl. x. fig. B.

? *Araneus marinus*, Seba, Thesaurus, III. 46, pl. xix. figs. 4, 5.

Leucosia longifrons, De Haan, Faun. Japon. Crust. p. 132, pl. xxxiii, fig. 4: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: A. Ortmann, Zool. Jahrbüch., Syst. etc., VI. 1892, p. 585.

? *Leucosia urania*,, Guérin, Icon. R. A. Crust., pl. vi. fig. 4 (*nec* Herbst).

Leucosia polita, Hess, Archiv für Naturges. XXXI. i. 1865, pp. 155 and 172, pl. vi. fig. 14; (and ? Haswell, Cat. Austral Crust. p. 120); *fide* de Man, Zool. Jahrbüch. Syst. etc., II. 1892, p. 585.

Leucosia ornata, Miers, Trans. Linn. Soc., Zool., (2) I. 1875–79, p. 236, pl. xxxviii. figs. 7–9.

Leucosia urania, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 197 (*nec* Herbst).

Carapace bluntly rhomboidal, about nine-tenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders finely beaded, and strongly sinuous, owing to the prominence of the edge of the well-defined hepatic region: its *true* postero-lateral border beaded only as far as the level of the first pair of legs (2nd pereiopods): its thickened milled epimeral border is visible, dorsally, only in its posterior third when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin short, gently curved, and finely beaded, with the deflexed surface below it quite smooth.

The thoracic sinus is no longer recognizable as the puckered mouth of a simple pterygostomian invagination: it is now a roughly Y-shaped cavity, the tail of the Y being defined by a line of 6 or 7 large pearly granules continuous with the milled epimeral edge of the carapace, the concavity of the fork of the Y being defined by the convex crenulated edge of the pterygostomian region, and the outer limb of the Y being a good deal longer than the inner.

The hepatic regions are strongly convex dorsally, their convexities being quite independent of the general convexity of the carapace.

The front is prominent, triangular, and dorsally convex; its length is at least equal to its breadth, and it ends in a projecting laminar triangular tip.

The ventral surface of the ischium of the external maxillipeds of the female is strongly convex up to a stout terminal tooth.

The chelipeds, in the adult male, are less than one-third longer than the carapace. The upper surface of the arm has both its anterior and posterior borders defined by a distally-incomplete row of tubercles, and, besides the basal eminence formed of 6 to 8 coalescent granules, has four—rarely five or more—large tubercles disposed in an irregular square just beyond the basal eminence: the inner surface of the arm has a few tubercles in its proximal half, as has also the under surface in its proximal fourth. The wrist is quite smooth. The hand is very little longer than broad, its inner edge bears a single row of granules which are often indistinct. The fingers are not much shorter than the hand, and their opposed edges are crenulate—and that but indistinctly—only in their distal two-thirds.

The legs have stout, subcylindrical, perfectly smooth meropodites, inflated carpopodites, propodites with a sharpish dorsal edge, and, in the case of the last pair, with the ventral edge sharp also, and narrowly lanceolate dactyli which are more than half again as long as their propodites.

The abdomen in both sexes consists of 4 distinct pieces, the third piece, in the male, having a denticle in the middle line.

Colours in spirit: carapace light yellowish-brown, with a horseshoe of six impressed white spots in the gastric region, and with a narrowly defined red ring in either branchial region posteriorly; legs broadly banded with yellowish red; fingers with reddish base and white tip; tubercles on upper surface of arm with red base, sharply defined, and white apex.

The carapace of an average adult male is 22 millim. long and 18 millim. broad, of an adult female 25 millim. long and 22 millim. broad.

Over 80 specimens of all ages, from the Andamans, Mergui, Ceylon, and the Persian Gulf.

48*a*. *Leucosia longifrons*, var. *neocaledonica*, A. Milne Edwards.

Leucosia neocaledonica, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 40, pl. ii. fig. 1; and ? Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46; and ? de Man, Notes Leyden Mus. III. 1881, p. 123.

? *Leucosia urania*, de Man, Notes Leyden Mus. III. 1881, p. 256.

This is certainly a well-marked variety, and perhaps a distinct

species. It differs from *L. longifrons*, De Haan, only in the following characters, adults of both sexes being compared: —

1. The carapace is closely punctate.

2. The antero-lateral border is *sharply* crenulate.

3. The hepatic regions although equally convex in the antero-lateral margins, have their dorsal convexity hardly distinguishable from the general convexity of the carapace.

4. The terminal tooth on the ventral surface of the ischium of the external maxillipeds of the female is extremely acute and prominent.

5. Along the inner edge of the hand, below the upper row of granules, which are very distinct, are several indefinite rows of granules.

6. Along the inner edge of the upper surface of the wrist is a line of 3 or 4 granules.

7. The meropodites of the ambulatory legs have three distinct longitudinal lines of granules, — one dorsal, two ventral.

8. The propodites of the ambulatory legs have their dorsal edges not merely sharp, but highly carinate, and have also their ventral edges carinate.

9. The colours, when good fresh spirit specimens are compared, are very different. On the gastric region is a pair of large ocelli with small white centres and very broad red outer rings. In faded specimens the colours are much those of *L. longifrons*, but even then, instead of two round spots or rings in the posterior half of the carapace, there are from 4 to 6 large spots round the posterior half of the circumference of the carapace.

Its average size is a little less than that of *L. longifrons*.

In the Museum collection are 35 adult males and females from Palk Straits, from Karáchi, and from the Persian Gulf.

48*b*. *Leucosia longifrons*, var. *pulcherrima*, Miers.

? *Cancellus anatum primus*, Rumph, Amboin. Rariteitkamer, I. 27, pl. x. fig. A.

Leucosia pulcherrima, Miers, Trans. Linn. Soc., Zool., (2) I. 1875–79, (1877) p. 236, pl. xxxviii. figs. 4–6: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46, and Cat. Austral. Crust. p. 119.

Leucosia splendida, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 47, pl. v. fig. 1, and Cat. Austral. Crust. p. 119.

This is certainly only a variety of *L. longifrons*, De Haan, from which it differs chiefly in the colouration, which is altogether richer and more brilliant. Adult females compared, the only apparent differences from *L. longifrons* are as follows: —

1. The surface of the carapace is slightly punctate.

2. The propodites of the ambulatory legs are highly carinate dorsally, and have also their ventral edges carinate, as in var. *neocaledonica*.

3. The two red rings on the posterior half of the carapace are often, but not always, much larger, and the six white spots on the anterior part of the carapace are enclosed in six red circles, which often partly coalesce to form a double trefoil pattern.

In the Museum collection are an adult female, two half-grown females, and a half-grown male, all from the Persian Gulf; and the characteristic trefoil pattern occurs only in the adult female.

49. *Leucosia urania*, Herbst.

Leucosia urania, Herbst, Krabben, III. ii. 17, pl. liii. fig. 3: Leach, Zool. Miscell. III. p. 21: Desmarest, Consid. Gen. Crust., p. 167: Milne Edwards, Cuv. Règne An., Crust. pl. xxv. fig. 1, and ? Hist. Nat. Crust II. 122: Bell, Trans Linn. Soc. XXI. 1855, p. 283, and Cat. Leucos. Brit. Mus. p. 6: Hilgendorf, MB. Ak. Berl. 1878, p. 811.

This species, although closely resembling *L. longifrons*, and especially the variety (or species) *neocaledonica*, is at once distinguished from these, and from all other species, by its comparatively great size. It is a giant in the genus *Leucosia*, the carapace of an adult female in the Indian Museum collection being 38 millim. long and 34 millim. broad, dimensions almost equalled by Herbst's figure.

It differs from *L. longifrons* only in the following particulars, adult females being compared:—

1. It is very much larger.

2. The antero-lateral border is but slightly sinuous, owing to the slight prominence of the hepatic regions, of which also the dorsal convexities are an almost indistinguishable part of the general convexity of the carapace.

3. The hand is as broad as long, and the fingers have their opposed edges crenulate throughout.

4. The meropodites of the legs are traversed ventrally by a line of granules.

5. The propodites of the legs are foliaceous.

6. The dactyli are broadly lanceolate, and are only equal in length to their propodites.

7. Colours (of a thoroughly well-preserved specimen that has been eight years in spirit) olive green, with a broad white median band, forked posteriorly, extending from the tip of the front to the after end of the gastric region; four dusky red blotches round the posterior half of the circumference of the carapace: legs yellow, banded with red; basal half of fingers red.

Loc. Andamans.

The single female specimen in the Indian Museum collection is the exact counterpart of Herbst's figure.

50. *Leucosia marmorea*, Bell.

Leucosia marmorea, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 286, pl. xxx. fig. 4: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*): A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

Carapace highly polished, piriform, *longer than broad by the whole extent of the front:* its antero-lateral borders finely beaded, *slightly* sinuous, and *gradually* convergent: its true postero-lateral border beaded only as far as the level of the first pair of legs (2nd pereiopods): its epimeral edge not visible in a dorsal view: its finely-beaded posterior margin *almost straight*, with the surface below it quite smooth.

The thoracic sinus is a roughly Y-shaped cavity, the tail of the Y being defined by a line of 5 or 6 small pearly granules continuous with the milled epimeral edge, the concavity of the Y being defined by the convex, *very finely* crenulated edge of the pterygostomian region, and both limbs of the Y being very short.

The hepatic regions are hardly defined posteriorly by a faint crease.

The front is prominent, dorsally convex, and truncate-triangular, ending in three minute teeth, of which the middle one is the largest.

The ventral surface of the ischium of the external maxillipeds of the female is smooth, *and not strongly convex.*

Chelipeds little longer than the carapace. The arm has its three borders tuberculate; its upper surface with 5 to 7 pearly tubercles, in two short rows, in its basal half, just beyond a basal eminence formed of 6 to 8 coalescent granules; its inner surface granular or tubercular in rather more than its basal half, and its under surface in rather more than its basal third. The wrist and hand both have a row of sharp-cut granules along their inner edge. The fingers, which meet only at their tips, have the opposed edges distantly crenulate.

The legs are slender: their meropodites are subcylindrical with longitudinal rows of microscopic granulation, dorsally and ventrally: their propodites have sharpish edges, but are not dilated: their dactyli, which are somewhat longer than the propodites, are very narrowly lanceolate.

Colours in spirit: rich warm yellowish-brown with two pale round spots on either side of the gastric region.

Length of carapace of an adult female 23 millim., breadth 18·5 millim.

A young and four adult females from the Andamans.

Among Indian species of the *L. longifrons* group, this is at once recognized by its elongate piriform carapace, by its truncate front, by its nearly straight posterior margin, by its slender legs, and by its warm cinnamon brown colour.

51. *Leucosia haswelli*, Miers.

Leucosia haswelli, Miers, 'Challenger' Brachyura, p. 324, pl. xxvii. fig. 2.

Carapace with the antero-lateral margins slightly sinuous, owing to the slight convexity of the hepatic regions, which also are defined posteriorly, on the dorsum of the carapace, only by a faint crease. In other respects the carapace almost exactly resembles that of *L. longifrons*, but is a little more convex.

The front ends abruptly in a projecting, sharply transverse, sinuous edge, the edge under a lens being seen to be faintly bilobed with each lobule again faintly emarginate.

The thoracic sinus is a roughly Y-shaped cavity *of no great depth*, the tail of the Y being defined by *four* large pearl-like granules situated above the base of the chelipeds, the concavity of the fork of the Y being defined by the convex *perfectly smooth* edge of the pterygostomian region, and the limbs of the Y being both equally short.

The ventral surface of the ischium of the external maxillipeds of the female is *moderately* convex *without a terminal tooth.*

The chelipeds are almostly exactly like those of *L. longifrons;* but on the upper surface of the arm there are always at least six pearly tubercles, in two short lines, running forwards from the basal eminence formed of coalescent granules, and these tubercles, like some of those on the inner edge of the arm, are of an uniform transparent blood-red colour; the wrist has a row of tiny blood-red granules along its inner edge; and the hand has not only a row of granules along its inner edge, but also, below this, a row of punctuations which become granules on the immobile finger: finally, the fingers are crenulate along the whole extent of their opposed edges.

Except that their propodites are sharply carinate, the legs exactly resemble those of *L. longifrons.*

Colours in spirit: light greenish yellow, mottled with darker, and with a dark greenish brown blotch on the posterior part of either branchial region and two white spots on either side of the gastric region.

Size of carapace of an adult male 21 millim. long and 18 millim. broad, of an adult female 22·5 by 20 millim.

37 specimens, young and adult, of both sexes, from the Andamans, are in the Indian Museum collection. In the smallest young the carapace is more elongate and its posterior border is almost straight, its whole shape being very much like that of *L. marmorea*, Bell.

52. *Leucosia pallida*, Bell.

Leucosia pallida, Bell, Trans. Linn. Soc. Vol. XXI. 1885, p. 285. pl. xxx. fig. 2, and Cat. Leucos. Brit. Mus. p. 7: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 48. (*gastric teeth*).

Leucosia obscura, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 285, pl. xxx. fig. 3, and Cat. Leucos. Brit. Mus. p. 7.

Leucosia pallida, var. *obscura*, Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 316.

? Leucosia parvimana, Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 159.

? Leucosia moresbiensis, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 49.

? Leucosia perlata, de Man, Notes Leyden Mus. III. 1881, p. 124 : Ortmann, Zool. Jahrbüch Syst. etc., VI. 1892, p. 584.

Carapace more nearly circular than in any other species of the genus, owing to the convexity of the antero-lateral margins ; its surface perfectly smooth ; its antero-lateral margins crenulate : its *true* postero-lateral margins beaded almost up to the level of the 2nd pair of legs (3rd pereiopods) ; its epimeral edge not visible in a dorsal view ; its posterior margin in the adult, as well as in the young, nearly *straight, salient, and having the outer angles dentiform*, the deflexed surface below being quite smooth.

The thoracic sinus is a Y-shaped cavity of no great depth ; the tail of the Y being defined by a row of 6 or 7 granules, *three or four of which are large and pearl-like ;* the concavity of the fork of the Y being defined by the convex smooth edge of the pterygostomian region ; and both limbs of the Y being equally short.

The front is much broader than long *and is distinctly concave in the mid-dorsal line, anteriorly :* it ends in three denticles, the middle one of which is the most prominent.

The ventral surface of the ischium of the external maxillipeds of the female is strongly convex up to a stout terminal tooth.

The upper surface of the arm is traversed, in its proximal half, by 7 to 9 pearly tubercles arranged in two rows running forwards from the basal eminence formed by the usual mass of coalescent granules : the inner edge of the upper surface of the wrist bears a few tiny tubercles : *the hand, which is more than three-fourths as broad as long, has its outer edge strongly carinate*, and its inner edge granular : the fingers meet only at their tips, where alone they are faintly denticulate, their length is four-fifths that of the hand.

Except that they are more slender, and have sharply carinated propodites, and slender very narrow dactyli, the legs are as in *L. longifrons.*

Colours in spirit : delicate lavender grey marbled with darker ; a pair of brown spots in the posterior part of the carapace, and two pairs of pale spots in the gastric region.

The carapace of an adult female is 21 millim. long and 18 millim. broad.

In the Indian Museum collection are 3 adult females (one with eggs) from the Andamans, and a young male from the Persian Gulf.

53. *Leucosia corallicola*, n. sp. Plate VI. fig. 4.

Carapace somewhat piriform, longer than broad almost by the whole length of the front: the antero-lateral borders gradually converging, and coarsely crenulate up to the smooth sharp lateral borders of the front: the true postero-lateral border, which is also crenulate, ceases abruptly at the level of the first pair of true legs: the posterior margin is quite straight with the outer angles pronounced: the epimeral edge is only visible dorsally in its posterior part.

The thoracic sinus is deep and distinct, but short and in places ill defined: its longitudinal limb is bounded by 3 or 4 small (small because the species is small) granules above the base of the chelipeds: the edge of the pterygostomian region, which defines it in front, is convex and irregularly wrinkled but not granular.

The front is almost as in *L. longifrons*: it is long, strongly convex dorsally, and ends in a broad triangular somewhat deflexed tip which projects beyond the orbits.

The ventral surface of the ischium of the external maxillipeds is not abnormally convex.

The chelipeds are as in *L. pallida*, as are the legs.

Colours in spirit: light yellow marbled with brownish. The carapace of not quite adult females, and of the males, is 10 millim. long and 8 millim. broad.

Loc. Off Malabar Coast, 29 fathoms on a bottom of "hard flat coral slabs" (Alfred Carpenter).

This species may possibly be Bell's *L. affinis* (Trans. Linn. Soc. Vol. XXI. 1855, p. 287, pl. xxx. fig. 6), but the front and the thoracic sinus are quite different from the figures of that species. It is certainly not the immature form of *L. longifrons*, *L. haswelli*, *L. pallida*, or *L. whitmeei*, to which group it belongs. Among Indian forms its closest relative is *L. pallida* Bell.

54. *Leucosia whitmeei*, Miers.

Leucosia whitmeei, Miers, Ann. Mag. Nat. Hist. (4) XVI. 1875, p. 342, and Trans. Linn. Soc., Zool., (2) I. 1875–79, p. 238, pl. xxxviii. figs. 16–18: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 397.

Carapace piriform, longer than broad by the whole length of the front; the antero-lateral borders hardly sinuous, gradually converging, and finely milled; the *true* postero-lateral border, which is also finely milled, ceases abruptly at the level of the interval between the chelipeds and the first pair of legs; the posterior margin, in the adult, no less than in the young, almost straight, with the external angles somewhat pronounced, the deflexed surface below being quite smooth; the epimeral edge visible to dorsal view only in its posterior part.

The thoracic sinus is a deep hardly Y-shaped cavity, since the outer limb of the Y is greatly produced and the inner limb is very short: the tail of the Y is defined by *two singularly large fungiform or reniform tubercles* with sometimes a third smaller one behind, and the strongly convex edge of the pterygostomian region, which defines the thoracic sinus in front, is finely milled.

The front is prominent, *almost quadrangular, with a sharply transverse sinuous edge and with its dorsal surface, anteriorly, markedly concave.*

The ventral surface of the ischium of the external maxillipeds of the female is broadly carinate up to a strong terminal tooth.

The chelipeds, in the adult male, are very little longer than the carapace. The arm is slender and is ornamented as in *L. pallida*: the wrist is quite smooth: the hand, which *is nearly twice as long as broad and nearly twice the length of the fingers*, has its outer edge carinate and its inner edge sharp: the short fingers meet only at the tip, where alone they are faintly denticulate. The legs are as in *L. pallida*.

Colours in spirit: fawn colour, the front of the carapace sometimes light olive-green; four large round brown spots round the circumference of the carapace behind; two pale spots on either side of the gastric region.

The carapace of the adult male is 14 millim. long and 11 millim. broad; that of the adult female is 13 millim. long and 11 millim. broad.

A young male and 26 adults of both sexes (many of the females with eggs) from the Andamans, are in the Indian Museum collection.

55. *Leucosia whitei*, Bell.

Leucosia whitei, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 289, pl. xxxi. fig. 2, and Cat. Leucos. Brit. Mus. p. 9: Hess, Archiv für Naturges. XXXI. i. 1865, pp. 155, 172: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 45, and Cat. Austral. Crust. p. 118: Miers, Zool. H. M. S. 'Alert,' pp. 184, 289, and 'Challenger' Brachyura, pp. 322 (footnote), 325: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

? *Leucosia chevertii*, Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 47, pl. v. fig. 2, and Cat. Austral. Crust. p. 120.

Carapace not appreciably longer than broad, elegantly urn-shaped; its surface smooth, except for (1) a narrow strip of thick short fur clothing its postero-lateral border, (2) a sharp angular granule-tipped eminence springing from the vault of either hepatic region, and (3) a patch of granules just dorsad of the lateral epibranchial angle; its antero-lateral border smooth as far as the front end of the thoracic sinus, and then beaded; its *true* postero-lateral border beaded as far as the level of the base of the 2nd pair of legs (3rd pereiopods); its epimeral edge visible in all its extent, dorsally; its posterior margin gently curved,

the inflexed surface below it having numerous punctuations and squamous granules.

The thoracic sinus is a simple cavity defined ventrally by a loop of small somewhat irregular granules, and not very well defined in front.

The front is broader than long, dorsally convex, and its tip, which is truncated pitted and deflexed, ends in 3 broad denticles.

The ventral surface of the ischium of the external maxillipeds of the female is smooth (non-carinate).

The sub-cylindrical arm is closely nodular everywhere except in the middle of the ventral surface; the sub-globular wrist has about half of its upper surface, and a band on the inner edge of its under surface, granular: the hand is inflated, or sub-globular, with its base granular, and its inner edge sharply crenulate: the fingers, which are not much shorter than the hand, meet only at their tips, where alone they are denticulate.

The legs are compressed: the meropodites, which are much compressed, are finely granular along the edges; the carpopodites and propodites are sharply carinate, dorsally; the dactyli, which are nearly as long as their propodites and carpopodites together, are narrowly lanceolate.

The abdomen of the female consists of 4 pieces, and the large third piece is again subdivided into 3 pieces by two deep furrows which, however, are broadly interrupted in the middle line.

A single egg-laden female from the Andamans has the carapace 14 millim. long and 13·5 millim. broad.

The colours, according to Bell, are light brown with small angular red spots on the carapace, and a large red spot on the upper surface of the hand.

Our single specimen, which has been in strongly carbolized spirit for over 20 years, is now an uniform stone grey.

56. *Leucosia cumingii*, Bell.

Leucosia cumingii, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 290, pl. xxxi. fig. 3, and Cat. Leucos. Brit. Mus. p. 9.

Carapace quite devoid of marginal fur, a little broader than long, the inequality being hardly appreciable in the adult female, elegantly hexagonal as in the preceding species. The antero-lateral border, the main curve of which would be slightly concave, is convex by reason of the strongly marked angular projection of the hepatic region. The antero-lateral margin may be obscurely milled just in front of its junction with the *true* postero-lateral border, *but the latter, as well as the posterior margin, is quite smooth:* the posterior margin is gently curved, and in the male prominent.

The thoracic sinus is a deep obscurely Y-shaped cavity full of hair, the tail of the Y being defined by a row of 5 flat pearly granules situated above the chelipeds, the inner limb of the Y being very short, and the outer limb of the Y being produced up to the antero-lateral border to accent the boundary between the hepatic and branchial regions, the concavity of the fork of the Y being sharply defined by the smooth convex edge of the pterygostomian region.

The front is broader than long, deflexed and obscurely bilobed at tip, and *a little concave in the mid-dorsal line anteriorly.*

The ventral surface of the ischium of the external maxillipeds of the female is perfectly flat.

The edges of the trigonal arm are tuberculate: on the upper surface of the arm two short rows of tubercles arise from a mass of granules and short hairs at the base of the arm, and run, one towards the inner, one to the outer, edge of the arm: the wrist and the hand are quite devoid of granules: the fingers are nearly as long as the hand, and meet only at the tips.

The legs have all the joints compressed but not dilated.

The abdomen of the male consists of 4 pieces, that of the female of 3 pieces only.

Colours in spirit: yellowish white with yellowish brown markings, the hand and the fingers each with a brownish cross-band, the abdomen of the female with brownish yellow markings in its anterior (true posterior) third.

A male and an egg-laden female from the Nicobars: the carapace of the male is 11 millim. long and 10 millim. broad, that of the female is $12 \times 11{\cdot}5$ millim.

57. *Leucosia sima*, n. sp. Plate VI. fig. 5.

Very closely related to *L. cumingii*, but differs from it, and from all other species of the genus, in the length of the posterior margin of the carapace, which is considerably more than half the greatest breadth of the carapace. Its form therefore would be broadly hexagonal, but owing to the shortness of the front and to the great convexity of the hepatic regions, it almost forms a pentagon.

Besides in the form of the carapace, which is unique in the genus, it differs from *L. cumingii*, Bell, only in the following characters, adult females being compared:—

1. The front hardly breaks beyond the general convexity of the anterior half of the carapace owing to the still greater angular prominence of the hepatic regions.

2. The antero-lateral margin of the carapace behind the angular

prominence of the hepatic region, and the postero-lateral margin up to the level of the base of the 1st pair of legs, are distinctly beaded.

3. The thoracic sinus has no definite boundary in front, although it is deep and defined ventrally by large pearly granules as in *L. cumingi*.

4. The inner edge of the upper surface of the wrist bears a row of granules, which is continued on to the base of the hand.

5. *The fingers are only half the length of the hand.*

An adult egg-laden female from Bombay has the carapace 13 millim. long and 13 millim. broad.

58. *Leucosia clata*, A. Milne Edwards.

Leucosia clata, A. Milne Edwards, Nouv. Archiv. du Mus. Vol. X. 1874, p. 41, pl. ii. fig. 2.

Carapace as broad as long, hexagonal, with the antero-lateral borders strongly convex and smooth: the *true* postero-lateral border is clothed with a strip of dense dark-coloured fur: there are also a few scattered stiff hairs on the posterior part of the epibranchial regions.

The thoracic sinus is a simple cavity, deep, sharply defined anteriorly, containing a good many hairs and a line of tiny granules, besides the row of 2 or 3 larger pearly granules (situated above the base of the chelipeds) which define it ventrally.

The front is prominent, broader than long, concave in the mid-dorsal line and distinctly bilobed.

The arm is markedly trigonal *with the antero-external angle expanded*, its upper surface is bounded internally by a row of pearly tubercles, externally by a row of pearly granules, and is otherwise smooth, except for a few granules almost hidden in hair and a single larger tubercle at its base. The wrist is smooth and subglobular, with obscure traces of carination along its outer surface. The hand is a little longer than broad and has its outer edge strongly carinate, the carina being continued on the mobile finger, where, however, it is less marked: the little lobule at the base of the inner margin of the hand is beaded all round its edge. The fingers, which are not much shorter than the hand, meet only at the tip, and have their opposed edges smooth throughout.

The legs are much compressed, and have the carpopodites strongly carinate dorsally, the propodites strongly carinate dorsally and ventrally, and the dactyli extremely slender and hardly as long as their propodites: the meropodites also of the last pair are carinate dorsally.

Colours in spirit: porcelain white or pale yellow. M. A. Milne Edwards describes the colours as bright greenish grey with numerous specks of orange red.

Besides a specimen from Upolu purchased from the Museum

Godeffroy, there are, in the Indian Museum collection two apparently adult males dredged, one off the south coast of Ceylon in 34 fathoms, and the other from the Persian Gulf.

The carapace of the latter is 8·5 millim. long and 8·5 millim. broad.

59. *Leucosia hæmatosticta*, Adams and White.

Leucosia hæmatosticta, Adams and White, Zool. 'Samarang,' Crust. p. 54, pl. xii. fig. 2: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 289, and Cat. Leucos. Brit. Mus. p. 8: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160: Miers, P. Z. S. 1879, pp. 20 and 40: A. O. Walker. Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111.

Carapace sharply hexagonal, elegantly urn-shaped, its breadth equal to its length; its surface smooth except for a strip of thick short harsh white fur, which extends from the lateral epibranchial angle along the whole length of the *true* posterior border; its antero-lateral borders slightly concave and smooth, or very faintly milled; its *true* postero-lateral border ending abruptly at the level of the base of the second pair of legs (3rd pereiopods); its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is visible, dorsally, in all its extent, when the carapace is held, without any inclination, straight in front of the observer's eyes; its posterior margin perfectly straight, with the outer angles well defined, and with the deflexed surface below it perfectly smooth.

The thoracic sinus is a simple cavity, defined in front by the smooth, very oblique, slightly convex edge of the pterygostomian plate: it is more or less filled with hair and is devoid of granules large enough to be seen with the naked eye.

The front is prominent, dorsally convex, much broader than long, and has its sinuous front margin strongly deflexed.

The chelipeds in the adult male are about one half as long again as the carapace. The upper surface of the trigonal arm has a single line of tubercles along its inner border, and a partly-fused double row along its outer border; at its base are some small tubercles hidden in a well-defined patch of encrusting spongy pubescence, of a whitish colour, from which two or three tubercles run forward to the inner border. The ventral border of the arm is tubercular, the tubercles arising somewhat profusely in a dense patch of spongy pubescence; the inner and under surfaces are quite smooth. The wrist is smooth, except for one or two tiny granules along its inner edge. The hand is a little longer than broad, its inner surface has a single row of granules, which is continued some way along the immobile finger. The fingers are about as long as the hand, and are somewhat hairy: their opposed edges

are crenulate along the distal two-thirds, the crenulation being most marked on the immobile finger.

The legs have the meropodites compressed, and concave on the ventral surface, the concavity being defined by two prominent longitudinal lines of granulation; the carpopodites dorsally subcarinate, but not dilated; the propodites carinate both dorsally and ventrally, but not dilated; and the dactyli narrowly lanceolate, and nearly as long as their carpopodites and propodites combined.

The abdomen of the male consists of 4 pieces, the third piece having a strong tooth in the middle line: that of the female consists of only 3 pieces.

Colours in life and in spirit: front pinkish-grey; the rest of the carapace ivory white covered with roundish crimson spots, which may be scattered, or may form a definite network: thoracic sterna, abdominal terga and external maxillipeds with similar spots; and a few similar but larger spots on the upper surface of all the joints of the chelipeds: legs banded with crimson.

In the Museum collection are two adult males and a half-grown female from the Madras side of Palk Straits, in 12 fms. and upwards.

The carapace of the largest male is 12·5 millim. long and 12·5 millim. broad.

60. *Leucosia margaritata*, A Milne Edwards.

Leucosia margaritata, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 42, pl. ii. fig. 3.

Differs from *L. hæmatosticta*, Ad. and Wh., only in the following particulars:—

1. Its size is even smaller, the carapace in the adult of either sex measuring only 8·5 millim. in length and 8·5 millim. in breadth.

2. The spongy pubescence on the base of the chelipeds, and the fur along the postero-lateral edge of the carapace are coal-black.

3. The hepatic regions are indicated by faint bulgings above the antero-lateral border.

4. The thoracic sinus is much shallower, being, in fact, almost obsolete.

5. The upper surface of the arm is bounded both in front and behind by *two* rows of pearly tubercles.

6. On the ventral surface of the basal joint of the external maxillipeds there is a sharp stout tooth, and another on the ventral surface of the ischium joint of the female.

7. Colours in spirit: old ivory white, the carapace and chelipeds elegantly reticulated with bright reddish brown.

In the Indian Museum collection are two adult males and an adult female laden with eggs. All came from an encrusted bottom of shells and shingle; one from the Andamans, one from the Malabar coast at 26–31 fms., and one from the Coromandel coast at 18 fms.

61. *Leucosia craniolaris*, (Herbst.)

?? *Cancer craniolaris*, Linnæus, Mus. Lud. Ulr. p. 431, and Syst. Nat., 12th ed., p. 1041.

Cancer craniolaris, Herbst, Krabben, I. ii. 90, pl. ii. fig. 17; and (?) Fabr. Ent. Syst. II. 441.

Leucosia craniolaris, Fabr. Ent. Syst. Suppl. p. 350: Leach, Zool. Misc. III. p. 21: Milne Edwards, Hist. Nat. Crust. II. 122: Bell, Trans. Linn. Soc. 1855, p. 283, and Cat. Leucos. Brit. Mus. p. 6: Miers, 'Challenger' Brachyura, p. 325, pl. xxvii. fig. 3: A. O. Walker, Journ. Linn. Soc. Zool, Vol. XX. 1890, p. 111: J. R. Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 397.

Leucosia craniolaris, var. *lævimana*, Miers, Zool. H. M. S. Alert, pp. 184 and 250, pl. xxvi. fig. A.

Carapace rather sharply hexagonal, about six-sevenths as long as broad: its surface perfectly smooth and devoid of hair: its antero-lateral borders finely beaded, almost straight, and gradually converging to join the sides of the truncate-triangular front without any abrupt break: its *true* postero-lateral border beaded, the beading ending rather abruptly at the level of the base of the first pair of legs (2nd pereiopods): its thickened milled epimeral edge, which is continuous with the posterior margin and ends at a sharp tooth just behind the base of the chelipeds, is visible, dorsally, in all its extent when the carapace is held, without any inclination, straight in front of the observer's eyes: its posterior margin is almost straight and finely beaded, and the deflexed surface below it is covered with rows of sharp granules.

The thoracic sinus is a deep cavity full of hair, and—when denuded—is devoid of any tubercles or granules visible to the naked eye: it is bounded in front by the finely beaded, or milled, convex edge of the pterygostomian plate, so as to end in two broad notches of nearly equal size. The convexities of the hepatic regions are an indistinguishable part of the general convexity of the carapace.

The front is prominent, dorsally convex, and truncate triangular; its length is less than its breadth; and it ends in five prongs, the outer of which on either side are the sharp external orbital angles, and the middle one of which is by far the most prominent.

The ventral surface of the ischium of the external maxillipeds, in the female, is strongly convex up to a strong terminal tooth.

The chelipeds, in the adult male, are two-thirds longer than the carapace: the trigonal arm has beaded edges, the beading failing at the distal end of the outer border, and being spread out and profuse at the

proximal end of the ventral border: all the surfaces of the arm, however, are practically smooth, for although there are a few small tubercles at their proximal ends, these are covered and almost concealed by a dense adherent encrusting spongy pubescence, which is specially well marked on the upper surface. The surface of the wrist is quite smooth, except for two or three tiny granules along the inner edge of the upper surface. The hand is nearly as broad as long, and its inner surface is bounded by two prominent longitudinal rows of sharp-cut bead-like granules, which are continued some way along the immobile finger. The fingers are nearly as long as the hand, and are stoutly denticulate along the whole extent of their opposed edges.

The legs have the meropodites much compressed, those of the first three pairs being sharply squared, with four sharp longitudinal lines of granules, and those of the last pair being broadened and carinated ventrally as well as dorsally; the carpopodites, in all, are compressed and strongly carinate dorsally; the propodites are compressed and strongly carinate both dorsally and ventrally; and the dactyli are broadly lanceolate.

The abdomen, in the male, to external view, consists of only 3 distinct pieces, the second piece bearing a tiny denticle in the middle line.

Colours in spirit: stone blue with indefinite longitudinal stripes of darker hue; chelipeds, above, livid purplish-blue; legs yellowish.

The carapace of an adult male is 23 millim. long and 20 millim. broad; of an adult female, 21·5 millim. long and 19 millim. broad.

In the Museum collection are 2 adult males and 3 adult females from the mouth of the R. Hooghly.

62. *Leucosia vittata*, Stimpson.

Leucosia vittata, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 159.

Differs from *L. craniolaris*, adults of both sexes being compared, only in the following particulars:—

1. The antero-lateral borders are distinctly emarginate behind the hepatic regions, the emargination being caused by the encroachment of the outer limb of the thoracic sinus, and being plainly visible, dorsally, when the carapace is held, without any inclination, straight in front of the observer's eyes.

2. The hand is very appreciably longer than broad, and the fingers are every bit as long as the hand.

3. The colours in spirit are: carapace blackish blue, or nearly black, with flame-coloured stripes; chelipeds from the distal fourth of the arm to near the tips of the fingers, smoky flame-coloured on both surfaces, as are also the legs; under surface of body ruddy brown.

In size similar to *L. craniolaris*.

Two adult males, an adult female, and a young female from the Andamans are in the Indian Museum collection.

In the young one the posterior margin of the carapace is perfectly straight, with the outer angles dentiform.

63. *Leucosia pubescens*, Miers.

Leucosia pubescens, Miers, Trans. Linn. Soc., Zool., (2) I. 1875–79 (1877), p. 238, pl. xxxviii. figs. 22–24: Haswell, P. L. S., N. S. Wales, Vol. IV. 1879, p. 46, and Cat. Austral. Crust. p. 119: de Man, Archiv. für Naturges. LIII. i. 1887, p. 390.

? *Pseudophilyra hoedtii*, de Man, Notes Leyden Mus. III. 1881, p. 125.

Pseudophilyra hoedtii, de Man, Journ. Linn. Soc. Zool. Vol. XXII. 1888, p. 198.

Differs from *L. craniolaris* Herbst, only in the following particulars:—

1. The front is as long as broad, and its sides meet the antero-lateral borders of the carapace at an angle.

2. The inflexed surface below the posterior margin of the dorsum of the carapace is quite smooth.

3. The thoracic sinus, when denuded of its hair, is a shallow cavity, and the edge of the pterygostomian region which bounds the sinus anteriorly is thickened, smooth, and little convex.

4. The inner edge of the hand is almost devoid of granules.

5. The meropodites of the first three pairs of legs are rounded, not sharply squared, and usually have only a single longitudinal row—ventral in position—of minute granules: those of the last pair, though compressed, are not carinate, except that ventrally, about the middle, they bear a serrated lobule.

6. The carpopodites of the legs are inflated and non-carinate, and the propodites are but slightly carinate.

7. In fresh spirit specimens the carapace is light slate blue, traversed longitudinally by four broken longitudinal stripes of greenish brown which are so far continuous as to form a treble loop something like an incomplete pair of spectacles or a rather fantastic U: the chelipeds and legs with bands of yellowish brown, and the base of the fingers yellowish brown. In old spirit specimens the markings are not found on the carapace.

The carapace of an adult male is 18 millim. long and 15 millim. broad, that of an adult female is 18·5 millim. by 15 millim.

In the Indian Museum collection are 3 adult males and 2 adult females from the Madras Coast, two adult females and a young male from the Persian Gulf, an adult and a half-grown male from the

Andamans, and young males from Palk Straits, Mergui (and Hong-kong).

The young male from Mergui has been named *Pseudophilyra hoedtii* by Dr. de Man.

64. *Leucosia truncata*, n. sp. Plate VI. fig. 6.

Differs from *L. pubescens*, ovigerous females compared, *only* in the following characters :—

1. The front is broad and so extremely short that its free edge does not project beyond, indeed barely projects as far as, the epistome.

2. The thoracic sinus is extremely shallow, but yet is a distinct sinus, with a row of minute granules above the base of the chelipeds.

3. The dactyli are palmulate.

4. A distinct line of sharp cut beads bounds the inner edge of the wrist and of the hand.

Two adult (ovigerous) females from the Orissa coast. The colouration is exactly similar to that of *L. pubescens*, but darker.

The first specimen that I saw I regarded, after careful examination, as either a malformation of *L. pubescens*, or a specimen of *L. pubescens* that had had its front broken and imperfectly repaired. But a second ovigerous female of exactly similar form, from another dredging station, now leads to the conclusion that, instead of being malformations, these two specimens must represent either a new species of the *L. craniolaris* and *rhomboidalis* type, or possibly may belong to the *L. porcellana* of Fabricius, which de Man states definitely is a true *Leucosia*.

At any rate the species here under consideration is a genuine *Leucosia*, and not a *Pseudophilyra* or *Philyra*.

65. *Leucosia rhomboidalis*, De Haan.

Leucosia rhomboidalis, DeHaan, Faun. Japon. Crust. p. 134, pl. xxxiii. fig. 5: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 284, and Cat. Leucos. Brit. Mus. p. 6: F. Muller, Verh. Ges. Basel, VIII. p. 472: A. Ortmann, Zool. Jahrbüch. Syst. etc., VI. 1892, p. 586.

? *Leucosia craniolaris*, Desmarest, Consid. Gen. Crust., p. 167, pl. xxvii. fig. 2.

Leucosia maculata, Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 159.

Differs from *L. craniolaris* Herbst, only in the following particulars, adults of both sexes being compared :—

1. Its size is very much smaller: the carapace of the adult, in our series of 23 specimens, is never more than 16 millim., and is usually about 14 millim. long.

2. The front, which is as long as broad, has its sides subparallel

and hence forming a very abrupt angle with the antero-lateral borders of the carapace: it ends in 3 teeth, of which the two outer are small and deflexed and only the middle one is large and prominent. As, also, the external orbital angles are inconspicuous, the front, when examined without a lens, seems to end in a single sharp point, as shown in De Haan's figure.

3. The thoracic sinus, when denuded of its hair, is a shallow cavity, and the edge of the pterygostomian region that forms its anterior boundary is thickened, smooth, and almost straight.

4. The chelipeds of the adult male are less than half again as long as the carapace.

5. The inner surface of the wrist is bounded both above and below by a line of granules.

6. Colours in spirit: carapace and dorsal surface of chelipeds blue-black; the carapace with two divergent crescents of dark red spots in its anterior half, following the anterior boundary of the epibranchial regions; tips of arms hands and fingers sometimes nearly white, bases of fingers sometimes yellow.

17 adults of both sexes (including females with eggs) from the Coromandel coast in 13 to 28 fathoms, and an adult male and female from the Andamans (besides 4 adults from Hongkong) are in the Indian Museum collection.

66. *Leucosia phyllochira*, Bell.

Leucosia phyllocheira, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 291, pl. xxxi. fig. 5, and Cat. Leucos. Brit. Mus. p. 9.

This species has a piriform carapace, and is distinguished from all its congeners by the following characters:—

1. The chelipeds are shorter than the carapace.

2. The arms have their upper surface much expanded.

3. The hands are broader than long, are foliaceous, and have both their inner and outer edges strongly carinate.

A single small specimen from Palk Straits is in the Indian Museum collection.

Onychomorpha, Stimpson.

Onychomorpha, Stimpson, Proc. Acad. Nat. Sci., Philadelphia, 1858, p. 162.

Carapace shaped much like a human nail, depressed, with all its margins, behind the front, forming a continuous laminar brim, increasing in breadth from before backwards and beneath which the true legs are almost entirely concealed in flexion: the expansion of the posterior

margin is particularly broad: the regions of the carapace are not delimited. Front short, hardly projecting beyond the general outline of the carapace, but projecting well beyond the edge of the buccal cavern. Eyes minute: orbits with a long suture in the roof, and a small gap at the inner canthus, but complete and affording complete concealment to the eyes: the floor of the orbit is closely appressed to the roof of the buccal cavern. Antennules folding a little obliquely. Antennæ obsolete.

Buccal cavern longer than broad: the exopodite of the external maxillipeds is elongate, and not much broader than the endognath, and has its outer edge a little curved: the acutely triangular merus of the endognath projects beyond the exognath, and is much longer than the ischium, measured along the inner edge.

The chelipeds, compared with the legs, are very massive: they are depressed and laminar, and are about the same length as the carapace: the fingers are stout, compressed, and very short.

The legs are slender and compressed, and when flexed are almost entirely concealed beneath the expanded edge of the carapace.

67. *Onychomorpha lamelligera*, Stimpson.

Onychomorpha lamelligera, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 162: A. O. Walker, Journ. Linn. Soc. Zool. XX. 1890 (1887), p. 111, pl. viii. fig. 3.

Carapace triangular with the sides slightly curved, a little longer than broad; depressed, laminar, and unguiform owing to the preponderance of the broad laminar brim, to which the true carapace (the part lodging the viscera) forms a low convex circular crown.

The surface of the carapace is smooth, without any indication of regions: the edge of the brim is elegantly striated. The under surface of the body is also quite smooth, except for the striations all round the edge of the carapace.

The front is a little recurved upwards.

The chelipeds, in the female, are a very little longer than the carapace: the arm is sharply trigonal, with the outer edge cristiform, the edge of the crest being finely striated like the edge of the carapace: the outer edge of the wrist is carinate, and a ridge traverses the upper surface of the wrist: the hand is laminar with the edges sharp and striated beneath a copious spongy pubescence; it is rather more than half again as long as broad, and more than twice as long as the compressed fingers.

The legs are short and slender, with the merus, carpus and propodite carinated, and the dactylus almost filiform.

In the female all the segments of the abdomen except the last appear to be fused together, although the first and second can be recognized.

The carapace of an apparently adult female is 7 millim. long, and 6·5 millim. in greatest breadth.

A single female occurs in the collection of the Indian Museum,—from Palk Straits.

Philyra, Leach.

Philyra, Leach, Zool. Miscell. III. p. 18.

Philyra, Milne Edwards, Hist. Nat. Crust. II. 131.

Philyra, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 299, and Cat. Leucos. Brit. Mus. p. 13.

Philyra, Miers, 'Challenger' Brachyura, p. 320.

Philyra can be at once distinguished from *Leucosia* by the absence of a thoracic sinus, and from *Pseudophilyra* by the fact that the front is broad and either not all produced to form a *Leucosia*-like snout, or if so produced (as it is, to some extent, in *Philyra platychira*) then the side-wall of either hepatic region forms an independent marginal facet.

Carapace usually circular and somewhat depressed, with the epistome projecting beyond the broad front; the dorsal surface of the carapace is generally bounded by a continuous beaded line; the hepatic and branchial regions usually fairly well defined by grooves or creases.

Buccal orifice transversely oblong, with the anterior angles broadly rounded: the exognath broadly dilated, usually foliaceous, the outer and anterior borders forming parts of one wide curve: the merus of the endognath narrowly and acutely triangular, the length of its inner border being not less, or not much less, than that of the inner border of the broad ischium.

Orbits small and sunken, with two sutures in the upper and outer wall, and a hiatus at the inner angle, where the minute antennal flagellum stands. The antennules fold transversely.

Chelipeds symmetrical and, relatively to the legs, very massive; longer in the male—about twice the length of the carapace—than in the female: true legs small.

The abdomen of the male consists of 3 or 4 pieces, that of the female of 4.

Key to the Indian species of Philyra.*

I. Carapace circular, never carinate or covered with pubescence dorsally: upper surface of chelipeds never longitudinally carinate:—

1. The epistome and the lower border of the marginal hepatic facet form a lobe that projects far beyond the front, like the lower jaw of a bulldog:—

i. Carapace as long as broad, its surface only partly, and very variably granular: chelipeds of adult male more than twice as long as the carapace ..... *P. scabriuscula.*

ii. Carapace a little broader than long, its surface always completely covered—except sometimes on the tip of the front—with beadlike granules: chelipeds of the adult male much less than twice the length of the carapace..... *P. verrucosa.*

2. The epistome projects either very slightly in all its extent, or not in its entire extent, beyond the front:—

i. The sidewall of the hepatic region forms, on either side, an independent facet on the antero-lateral margin of the carapace: the margin of the epistome is deeply cleft on either side, below the eye; hands between 2 and 3 times as long as broad, fingers with their opposed edges toothless..... *P. platychira.*

ii. The sidewall of the hepatic regions is not flattened to form a facet: the margin of the epistome not cleft below the eye: hands never twice as long as broad, fingers denticulate:—

a. The carapace is almost smooth to the naked eye: the regions of the carapace are hardly defined:—

a. The whole of the epistome projects beyond the front, which is hardly pubescent: the beads on the line that defines the circumference of the carapace are of uniform small size: terminal segment of the exognath roughly semicircular: hands not inflated, fingers not strongly bent inwards in the male: sixth abdominal tergum quite smooth..... *P. globosa*, (Fabr.)

β. Only the internal angles of the afferent branchial orifices project beyond the front, which is hairy: some of the marginal granules of the carapace are enlarged and almost dentiform, at fairly regular intervals: terminal segment of the exognath ovally, and very elegantly, foliaceous: fingers, in the male, strongly bent inwards: sixth abdominal tergum, in the male, with a small median denticle *P. globulosa*, Edw.

b. The regions of the carapace form independent swellings, the convexities of which are closely covered with large vesiculous granules..... *P. corallicola.*

II. Carapace sharply hexagonal, the posterior margin quite straight and the posterior angles dentiform: traversed fore and aft by a median carina, and with an oblique carina on either branchial region: upper surface of chelipeds traversed—from base of arm to finger-cleft—by a sharp ridge..... *P. sexangula.*

* Dr. Henderson includes *Philyra adamsii* Bell (Trans. Linn. Soc. Vol. XXI. 1855, p. 301, pl. xxxiii. fig. 1) in the Indian Fauna. I have not given it a place in this Key because, from the figures and description, I cannot satisfy myself that it is really a *Philyra*. It seems to me to be, rather, a *Pseudophilyra*.

68. *Philyra scabriuscula*, (Fabr.)

Seba, III. pl. xix. figs. 10, 11.

? *Cancer cancellus*, Herbst, Krabben, I. ii. 94, pl. ii. fig. 20.

Leucosia scabriuscula, Fabricius, Ent. Syst. Suppl. p. 349: Latreille, Hist. Nat. Crust. et Ins. VI. 116.

Philyra scabriuscula, Leach, Zool. Miscell. III. p. 22: Desmarest, Consid. Crust. p. 167: Milne Edwards, Hist. Nat. Crust. II. 132, pl. xx. figs. 9, 10: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 299, and Cat. Leucos. Brit. Mus. p. 14: Heller, 'Novara' Crust. p. 70: de Man, Notes Leyden Mus. III. 1881, p. 126: Lenz and Richters, Abh. Senck. Ges. XII. 1881, p. 425: Muller, Verh. Ges. Basel, VIII. 1886. p. 473: de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 201: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 399.

The epistome and the subhepatic regions form a dorsally-flattened, marginally-crenulate, rounded lobe, which is separated from the anterior curve of the carapace by a groove and projects far beyond the front, like the lower jaw of a bulldog.

The carapace is discoidal, with the margin beaded and the dorsal surface very variably ornamented with vesicular granules visible to the naked eye: these, however, never completely cover the carapace, and are rarely altogether absent, but are generally confined to the outer part of the branchial regions and to the branchio-cardiac grooves, which are broadly defined. The hepatic regions also are defined, by a slight marginal indentation and by a dorsal wrinkle.

The front is divided into two lobes by a deep broad groove, and the roof of the orbit is deeply fissured, so that the external orbital angle is acutely emphasized.

The edges of the thoracic sterna and the basal edge of the abdomen, as well as the greater part of the pterygostomian regions, are ornamented with polished granules; but the surface of the external maxillipeds is perfectly smooth, except in the female, where there are traces of granulation on the endopodite.

The chelipeds in the adult male are about $2\frac{1}{2}$, in the adult female about $1\frac{4}{5}$, times the length of the carapace: the arms bear rows of beadlike granules running along the upper and inner surfaces but fading away distally; the under surface of the arm is almost smooth: the inner edge of the wrist has a single row, and the inner edge of the hand several rows, of minute vesicular granules, which are hardly visible to the naked eye even in the male, and are obsolescent in the female. The hands are twice as long as broad: the fingers, although they meet only at their extreme tip, are denticulate all along the opposed edges; the mobile finger is nearly as long as the hand.

The legs are slender and smooth, except for a line of microscopic granulation along the under surface of the meropodites.

The abdomen of the adult male consists of two linear and hidden basal pieces, a triangular apical piece, and a long triangular middle piece in which the division of the 6th tergum is marked by a faint transverse groove.

The diameter of the carapace of the adult male is 12 to 14 millim., of the adult female about 10 millim..

Colours in spirit: carapace mottled with dull brown and greenish shades; chelipeds distinctly and legs indistinctly banded with dull brown.

In the Indian Museum collection are 110 specimens from Tavoy, Mergui, Madras coast, Travancore coast, Karáchi, Mekrán coast, and Persian Gulf.

1. A variety from Madras—represented by a single male—has the greater part of the carapace covered with granules, four of which—one in the mid-gastric, one in the mid-cardiac, and one on either branchial region—are much enlarged; and has chelipeds a good deal less than twice the carapace in length.

2. A variety from the Nicobars—also represented by a single male—has the whole carapace, except the front and the anterior limit of the gastric region, very closely covered with large granules much as in the next species.

69. *Philyra verrucosa*, Henderson.

Philyra verrucosa, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 399, pl. xxxvii. figs. 10–12.

Differs from *P. scabriuscula*, (Fabr.), adults of both sexes being compared, only in the following characters:—

1. The carapace is irregularly oval rather than discoidal, especially in the female, owing to the greater lateral bulging of the branchial regions.

2. The whole dorsal surface of the carapace, except sometimes the front, is closely covered with beadlike granules, which are larger posteriorly, and one of which—somewhere near the middle—is usually enlarged.

3. A slight transverse dorsal indentation separates the hepatic from the branchial region on either side, but there is no independent dorsal bulging of the latter.

4. The branchio-cardiac grooves are narrow and deep.

5. The front is divided into two lobes by a broad shallow groove: the fissure in the roof of the orbit is indistinct, so that the external orbital angle is not sharply pronounced.

6. The whole surface of all the thoracic sterna is closely beaded, and the surface of the exopodite as well as of the outer half of the endopodite of the external maxillipeds is granular.

7. The chelipeds, in the adult male, are less than twice the length of the carapace: the distal end of the upper surface of the arm is covered with granules, and the greater part of the under surface of the arm is granular: the wrist and hand of the male have, along their inner edge, a row of granules quite visible to the naked eye: the hand is only half again as long as broad.

8. The size is a good deal smaller—the carapace of the adult male being about 9 millim. long and 10 millim. broad, that of the adult female being about 8 millim. long and 9 millim. broad.

9. Colours in spirit: dorsum blue-black, with a coppery tinge which is most marked on the chelipeds.

12 adults (male and female) from off Puri, 10 fathoms, from Madras, and from Karáchi, are in the Indian Museum.

70. *Philyra sexangula*, n. sp. Plate VII. fig. 2.

The whole exoskeleton, excluding the tips of the fingers and dactyli, is closely covered with a short close microscopic velvet-like pubescence—both dorsally and ventrally.

Carapace as long as broad, sharply hexagonal, traversed fore and aft by an interrupted median carina: the branchial regions are also traversed obliquely backwards each by a carina which terminates on either postero-lateral margin at a sharp eminence. The straight posterior margin has its outer angles strongly dentiform.

The side wall of either hepatic region forms an independent facet, which also involves the front and thus presents a condition intermediate between that of *P. platychira* and *P. scabriuscula*.

The edge of the front is straight and bilobed, and the straight edge of the epistome projects beyond it. There is a slight notch in the edge of the epistome beneath the eye on either side.

The chelipeds in the adult male are nearly $2\frac{1}{2}$ times as long as the carapace; their upper surface, from the base of the arm to the finger cleft, is traversed by a sharp ridge; they are devoid of any granules visible through the general velvet: the hand is twice as long as broad, and the fingers are rather over two-thirds the length of the hand and have their opposed edges finely denticulate and hairy: the inner edge of the upper surface of the hand is traversed by a second sharp ridge.

The legs are slender and compressed, the under edge of their propodites and dactyli being fringed with long hairs.

The abdomen of the male appears to consist of only two pieces, namely a small apical piece, and a long triangular plate in which the 6th tergum is marked off by a groove and bears a strong median tooth.

The diameter of the carapace of the male is 8 millim.

Colours uniform blackish brown everywhere above and below.

Loc. Godávari coast, Sacramento shoal, 6 fms., a single male: and Persian Gulf, a male.

In the specimen from the Persian Gulf the surface of the carapace beneath the velvet-like pubescence is uniformly punctulate in honeycomb fashion; and the edges of the carapace, the epibranchial carinæ, and the edges of the chelipeds and of their longitudinal ridge, as also of the second ridge along the inner edge of the hand, are all evenly granular. A near ally of this little species appears to be *P. punctata*, Bell.

71. *Philyra platychira*, De Haan.

Philyra platychira De Haan, Faun. Japon. Crust. p. 132, pl. xxxiii. fig. 6: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Leucos. Brit. Mus. p. 15: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 160: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*): Miers, 'Challenger' Brachyura, p. 321: de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 201: J. R. Henderson, Trans. Linn. Soc. Zool., (2) V. 1893, p. 400.

Philyra longimana, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 43, pl. ii. fig. 4: Miers, 'Challenger' Brachyura, p. 321.

Carapace convex, subcircular, but pinched in to form an independent marginal facet in either hepatic region: the circumference is beaded, as also—but less distinctly—are the margins of the lateral hepatic facets: the surface of the carapace, to the naked eye, is almost always quite smooth: the branchio-cardiac grooves are distinct.

The edge of the front is almost straight and is broadly bilobed, the whole of the epistome projects beyond it. The edge of the epistome is deeply cleft just below the eye, on either side.

The thoracic sterna have the edges, and the first sternum the surface also, beaded or granular.

The external maxillipeds have the surface smooth, and the edges of certain of their segments finely and inconspicuously fringed as in *P. globosa* (Fabr.), only the hairs on the inner edge of the endognath of the female being conspicuous: the distal segment of the exognath is less dilated than in any other Indian species.

The chelipeds in the adult male are $2\frac{1}{2}$ times, in the adult female $1\frac{5}{6}$ times, the length of the carapace: the arms have a few rather distant small vesicular granules on the basal third of, and also along the inner border of, the upper surface, and on the base and along the lower border of the inner surface, besides other tiny granules only visible with a lens: the surfaces of the wrist and hand are smooth. The hand is thin—

almost lamellar—with sharp edges, the inner of which is finely crenulate; in the adult male its length is nearly three times its breadth. The fingers, which are not as long as the hand, are also very thin and lamellar, and are elegantly curved: their opposed edges are sharp and *entire*, the cutting edge of the immobile finger being rather thickly fringed with hair.

The legs are slender and smooth, except for a line of tiny granules along the under surface of the meropodites.

The abdomen of the male consists of a single linear and concealed basal piece and a small triangular terminal piece, and, between the two, a long smooth triangular piece, which is bilobed and granular at base and has the sixth tergum demarcated by a deep groove.

The colour in spirit is uniform coppery.

The carapace of the adult male is 13 or 14 millims. in either diameter, that of the female 12 or 13.

In the Indian Museum collection are 40 specimens, adults and young of both sexes, from the Andamans, Mergui, Karáchi, and the Persian Gulf.

The Persian Gulf specimens, which are quite adult, have the dorsal surface much mottled with green and brown, and the immobile finger denticulate beyond the line of hair.

72. *Philyra globosa*, Fabr., de Man.

Philyra globosa, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 202: *only that part referring to Fabricius' female type and to the Mergui specimens.* This reference is placed first because Dr. de Man has examined Fabricius' types, male and female, of *P. globosa*, and the species here under consideration corresponds with Fabricius' female type as re-described by de Man.

?? Rumph, Amboin. Rariteitk. pl. x. fig. D.

Cancer globosus, Fabr., Sp. Insect. I. 497 and Ent. Syst. II. 441.

? *Cancer globus*, Herbst, Krabben, I. ii. 90.

Leucosia globosa, Fabr. Ent. Syst. Suppl. p. 349: Latreille, Hist. Nat. Crust. et Ins. VI. 117.

? *Philyra globosa*, Leach, Zool Miscell. III. 22 (reference to male); and (?) Desmarest, Consid. Crust. p. 168.

? *Cancer porcellanus*, Herbst, Krabben I. ii. 92 (*nec syn.*), pl. ii. fig. 18.

Philyra porcellana, Milne Edwards, Hist. Nat. Crust II. 133: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Leucos. Brit. Mus. p. 14 (*nec syn.*)

Philyra polita, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 401, pl. xxxviii. figs. 1–3.

The whole exoskeleton (when not incrusted with *Hydrozoa*, &c., as it commonly is) has, to the naked eye, the appearance of glazed porcelain, although when examined with a lens it is minutely punctulate and granular.

The carapace is subcircular, the anterior portion being an arc of a smaller circle than the posterior; its dorsum is defined all round, behind the hardly at all pubescent front, by a line of fine beads all of equal size.

The epistome projects well beyond the edge of the front, which is deflexed, the deflexed portion being slightly acuminate downwards in the middle line.

None of the regions of the carapace are in any way defined.

The thoracic sterna and the base of the abdomen are bordered by granules, which are flattened and depressed.

The *surface* of the external maxillipeds is quite devoid of hair, though the edges of the exopodite have a fringe of exceedingly short hair, and the inner edge of the endopodite is, in the female, fringed with hair that is somewhat longer. The expanded exopodite is very broad anteriorly and has the inner edge quite straight (not curved).

The chelipeds in the adult male are a little more than twice the length, in the adult female about $1\frac{3}{4}$ times the length, of the carapace. The arms are covered with close-set flattened pearly granules on the upper surface except near the tip, on the whole of the inner surface, and on the basal half or third of the under surface. The wrist and hand are quite smooth, and only very occasionally in old males the inner surface of the hand is, under the lens, but not to the naked eye, roughened. The hand in both sexes is a little more than half again as long as broad, and is not inflated.

The fingers have much the same form in both sexes: they are almost in the same straight line with the hand; they meet closely only at tip, although they are faintly denticulate along the greater part of their extent; they do not, in the male, bear any enlarged dentiform tubercle; and the length of the dactylus is hardly greater than that of the outer border of the hand.

The true legs are not much longer than the male arm; their meropodites have every surface quite smooth, their propodites are bluntly carinate, and their dactyli lanceolate.

The abdomen of the male consists of two linear basal pieces and a triangular apical piece, and, between the two, a long narrow triangular plate which has no median denticle and is divided by a transverse groove of no great depth.

Colours in spirit: smoky bluish brown above, the blue deepest on the carapace.

The diameter of the carapace of the adult male does not exceed 20 millim., that of the adult female does not exceed 17 to 18 millim.

In the Indian Museum collection are 110 specimens, both young and adult, of both sexes, from the East coast, from the mouth of the Hooghly to Madras—and also from Karáchi.

Besides these there are 4 specimens (two males more than half-grown, a younger male, and one very young specimen) from Mergui. These have been compared by Dr. de Man with Fabricius' types of *P. globosa* from the Kiel Museum, and are stated by him to agree with Fabricius' female type.

They do not however, as Dr. de Man appears to suspect, agree with Fabricius' male type, and this involves a delicate question of synonymy.

From Dr. de Man's description it is evident that Fabricius' male is a species quite distinct from his female: as a matter of fact it appears to be the species named by Milne Edwards—and named probably with foresight—*P. globulosa.*

It seems therefore preferable to apply Milne Edwards name, *P. globulosa,* to Fabricius' male type, and to leave the name *P. globosa* in possession of Fabricius' female type.

The only other alternative is to make use of Dr. Henderson's name *P. polita* for Fabricius' female, and to let *P. globosa* stand for Fabricius' male. But this, I think, would be a little unjust to Dr. de Man, upon whose prior work the present attempt to clear up the confusion between the two species is based, and a little wanting in respect to the memory of the founder of modern carcinology.

73. *Philyra globulosa*, Edw.

?? *Cancer anatum*, Herbst, Krabben, I. ii. 93, pl. ii. fig. 19.

Philyra globulosa, Milne Edwards, Cuvier Règne An. Crust. pl. xxiv. fig. 4, and Hist. Nat. Crust. II. 132 (*nec syn.*): Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 300, and Cat. Leucos. Brit. Mus. p. 14 (*nec syn.*)

? *Philyra globosa*, Leach, Zool. Miscell. III. p. 22 (female only): ? Desmarest, Consid. Crust. p. 168 (part).

Philyra globosa, de Man, Journ. Linn. Soc., Zool., Vol. XXII. 1888, p. 203: *only that part relating to Fabricius' male type*, and *not* the part relating to Fabricius' female type and to the Mergui specimens.

? *Philyra heterograna*, Ortmann, Zool. Jahrbuch. Syst. etc. VI. 1892, p. 582, pl. xxvi. fig. 17, (half-grown male).

The whole exoskeleton (when not incrusted with *Hydrozoa* &c., as it rarely is) has the somewhat greasy look and feel of unglazed porcelain, except the legs and abdomen, which are polished.

The carapace is circular, its dorsum is defined all round, behind the hairy front, by a line of granules, some of which, at fairly regular intervals, are much enlarged and may even, in young specimens, form distinct denticles.

The epistome can be scarcely said to project beyond the front, since only the inner angles of the afferent branchial canals do so.

The edge of the front is emarginate in the middle line, so as to make the front, when denuded of hair, broadly bilobed.

An indentation of the margin of the carapace separates the hepatic from the branchial regions, and a broad groove separates the branchial regions from the cardiac and intestinal regions, on either side.

A band of granules visible to the naked eye is always found

on either pterygostomian region, bounding the buccal cavern; and almost always in females and young males, and often but by no means always in adult males, the hepatic regions and the outer and posterior parts of the epibranchial regions are distinctly granular to the naked eye.

The exposed parts of the thoracic sterna are more or less covered with granules, and there are granules on the base of the abdomen. But the greater part of the abdomen, in contrast with the sternum, is polished.

The edges of the maxillipeds are hairy in the same manner as, but much more coarsely than, those of *P. globosa* Fabr., and the surface also is in large part covered with hair: the foliaceous exopodite has an elegantly oval shape, owing to the fact that its inner edge is curved and enters the common curve of the outer and anterior edges without any abrupt transition.

The chelipeds in the adult male are a little more than twice the length, in the female only about $1\frac{1}{3}$ times the length, of the carapace. The arms bear numerous sharpish granules (speaking of those visible to the unaided eye alone) on the basal third (male) or basal half (female) of the upper surface, all along both the inner and outer borders of the upper surface, and on the basal third and inner border of the lower surface. The wrist has a row of granules along the upper border of its upper surface, and commonly also along the under border of the same surface; and the inner surface of the hand is defined above by a row of prominent granules, and below by several lines of smaller granules—all continued on to the base of the immobile finger, and all being very much less distinct in the female than in the male. The fingers are fluted, with the outer borders granular at base. The hand in the female is hardly longer, and in the male is only about one-fifth longer, than broad, and is considerably inflated. The fingers differ considerably according to sex, but both sexes agree in having the dactylus very markedly longer than the outer border of the hand, in the male they are bent inwards at an angle of about 145° with the hand, and the edge of the basal half of the dactylus is a good deal hollowed to make room for a strong dentiform tubercle on the opposed edge of the immobile finger; and it is only beyond this tubercle and its corresponding hollow that the fingers are denticulate: in the female the fingers are not bent inwards strongly, and their opposed edges are unbroken, and are denticulate in the greater part of their extent.

The true legs resemble those of *P. globosa*, except that (1) the under surface of the meropodites is granular—a line of granules on

the first pair, in the male only, being much enlarged, and (2) that the dactyli are distinctly palmulate.

The abdomen of the male consists of a single linear basal piece and a triangular apical piece, and, between the two, a long triangular plate which is divided in its distal fourth by a deep transverse groove, the piece so cut off bearing a median denticle in its distal half.

Colours in spirit: light yellowish-pinkish-brown to coppery, with a bluish tinge over a large part of the dorsum of the carapace.

The diameter of the carapace of the adult male is 29 to 30 millim., that of the adult female 22 to 24 millim.

In the Indian Museum collection there are 160 specimens collected all along the East coast, from the mouth of the Hooghly to Point Calimere, and on the coasts of Travancore, the Andamans, and the Persian Gulf.

74. *Philyra corallicola*, n. sp. Plate VII. fig. 1.

Carapace perfectly circular, convex: the hepatic regions form a pair of distinct dorsal swellings, and the branchial regions are separated from the median regions by deepish grooves: the summits of the hepatic regions, the posterior part of the gastric region, and the convexities of all the other regions are closely covered with vesiculous granules like those of *P. verrucosa*, but the grooves and hollows of the carapace are quite smooth. The front is divided longitudinally, from edge to base, into two tumid lobes by a deepish groove: its edge is straight and the tips of the mouth-parts can only just be seen beyond it in a dorsal view. The entire margin of the carapace is finely evenly and sharply crenulate. The sternum and convexities of the pterygostomian regions are finely granular, as are also the outer and distal parts of the external maxillipeds.

The external maxillipeds are shaped as in *P. globulosa*, Edw.

The chelipeds in the male are about $1\frac{1}{4}$ times the length of the carapace: the arm is closely covered, everywhere except on a distal patch of the inner surface, with vesiculous granules, which are largest on the upper surface: the wrist and hand are finely granular; there is a raised row of granules on the outer edge of the wrist, which becomes a granular crest on the outer edge of the hand; and there are two raised rows of granules along the inner surface of the hand: the fingers are about as long as the hand. The abdomen of the male consists of 3 pieces, the broad base of the long triangular second piece being granular: at the distal end of the second piece is a stout denticle.

Diameter of the carapace of an apparently adult male, 6 millim.

Loc. off Malabar Coast, 29 fms. on a bottom of "hard flat coral slabs" (Alfred Carpenter).

At first sight this species resembles *P. verrucosa*, Henderson, from which it is easily distinguished on close examination.

Pseudophilyra, Miers.

Pseudophilyra, Miers, P. Z. S., 1879, p. 40.

Of the small forms grouped together in the genus *Pseudophilyra* some present the greatest resemblance to the smaller species of *Leucosia*, and others to the smaller species of *Philyra*. All, however, may be distinguished from *Leucosia* by the absence of any trace of a "thoracic sinus"; and all may be distinguished from any Indian species of *Philyra* by the following characters:—(1) either the whole free edge of the front, or at least the tip of its median tooth, projects beyond the level of the epistome; (2) the buccal cavity is either longer than broad and shaped as in *Leucosia*, or only a very little broader than long; (3) the exognath of the external maxillipeds is never broadened, and never has the outer and anterior borders forming one unbroken sweep; (4) the front has always the form of a distinct snout, convex, and pinched off, at base, from the hepatic regions. Now in the only Indian species of *Philyra* in which this to some extent occurs, the side wall of either hepatic region forms an independent marginal facet to the carapace—a thing never seen in *Pseudophilyra*.

The whole exoskeleton porcellanous.

Carapace subcircular or subpiriform, convex, with the regions usually not defined; produced in front to form a short upturned snout, similar in all its relations except length to that of *Leucosia*. The carapace is defined all round behind the front by a continuous raised and usually beaded line: its epimeral edge is not appreciably thickened, and is not approximated to the true lateral margin, so that there is no infolding of the lateral wall of the carapace or "thoracic sinus": nor is the epimeral edge of the carapace continuous with the line that defines the dorsum of the carapace posteriorly, as it is in *Leucosia*.

The buccal cavern is truncate-triangular: its length is usually greater than, but sometimes slightly less than its greatest breadth: the outer margin of the exognath meets the anterior margin abruptly, the exognath not being dilated.

The chelipeds are symmetrical and, relatively to the legs, very massive: in the male they are nearly twice the length of the carapace: a large part of the surface of the arms is ornamented with beadlike and vesicular granules: the hands are broad, but usually not so broad as long: the fingers are usually somewhere about the same length as the hand.

The abdomen of the male usually consists of 4 pieces, but the two

basal pieces are usually linear and hidden. The abdomen of the female consists of 3 or 4 pieces.

Key to the Indian species of Pseudophilyra.

I. Front tridentate, the whole of its free edge projecting well beyond the epistome: carapace strongly convex: buccal cavern elongate, truncate-triangular, quite as in *Leucosia*:—

1. Carapace closely and coarsely punctulate: hepatic regions defined: thoracic sterna of male normal ..... *P. tridentata.*
2. Carapace smooth and polished: third thoracic sternum of male with two processes or teeth,—one on either side of the abdomen:—
   i. Hepatic regions defined: hands longer than broad: processes of third thoracic sternum stout, and projecting only on to the second sternum ..... *P. pusilla.*
   ii. Hepatic regions not defined: hands as broad as long: processes of third thoracic sternum laminar, and projecting well on to the first sternum ... *P. wood-masoni.*

II. Front divided almost from the base by a deep longitudinal groove, its free edge straight and projecting just beyond the epistome: carapace strongly convex, with most of the regions well defined and tumid; the branchial, cardiac, post-gastric, and to a less extent the hepatic regions are, at any rate in the male, conspicuously granular in their tumid portion: buccal cavern a little broader than long ..... *P. blanfordi.*

III. Front with a single median tooth, the tip of which alone projects beyond the epistome: carapace moderately convex, with the hepatic regions defined: buccal cavern as long as broad ..... *P. melita.*

75. *Pseudophilyra tridentata*, Miers.

Pseudophilyra tridentata, Miers, P. Z. S. 1879. pp. 20, 41, pl. ii. fig. 4.

Carapace subpiriform, its dorsum coarsely closely and uniformly punctulate everywhere except near the tip of the front, and defined all round behind the antero-lateral margins by a minutely-beaded line.

The front projects well beyond the margin of the buccal cavern and ends in three laminar teeth, the middle one of which is much the largest. The external orbital angles are acute, but do not reach the level of the frontal teeth. Posteriorly the frontal region extends straight backwards, between the hepatic regions, as a ridge, which is particularly conspicuous in the male. On either side of this ridge the hepatic regions are much depressed, but behind the depressions they form distinct mamillary elevations.

In the male the anterior and lateral margins of the sternum are indistinctly punctate, and the edges of the fossa in the first segment that lodges the tip of the abdomen are very finely beaded: in the female only the front border of the sternum is punctulate.

The chelipeds in the adult male are about $1\frac{2}{3}$ times the length of the carapace: the upper surface of the arm is irregularly granular in its basal half, punctulate in its distal half; the inner surface is covered with tiny vesicular granules in its basal half, the under surface is smooth: the wrist and hand are smooth, the hand about half as long again as broad: the fingers, which are as long as the hand is broad, meet only at tip and have the opposed edges almost smooth.

The first pair of true legs exceed the arms in length by almost the last two joints.

The male abdomen is narrow and triangular and consists of 4 pieces, but the two proximal pieces are linear and concealed: the long third piece has a median tooth near the distal end.

The carapace of the male measures 10 by 8 millim., that of the female 11·5 by 10 millim.

Colours in spirit: pinkish grey mottled with reddish and yellowish brown; spotted cross-bands of brown on arms and hands, and a cross-band of reddish brown on the fingers.

In the Indian Museum collection are two adult males and four adult females from the Persian Gulf.

76. *Pseudophilyra wood-masoni*, n. sp. Plate VI. fig. 3.

Carapace subpiriform, perfectly smooth and polished, its dorsum defined all round behind the hepatic regions by a faintly raised, smooth (microscopically granular) line.

The front projects beyond the margin of the buccal cavern and ends in three teeth of nearly equal size, but it is not prolonged backwards as a ridge between the hepatic regions. The external orbital angles are not acute.

The hepatic regions have no convexity distinct from the general convexity of the carapace.

In the male the third thoracic sternal segment is produced, on either side of the abdomen, to form a laminar tooth which projects forwards, across the second segment, well on to the first. And the margins of the fossa in which the tip of the abdomen is lodged are finely beaded.

The chelipeds in the adult male are twice the length of the carapace, and are exceptionally massive—the arm being between a half and a third as broad as long: the arm has its inner border and proximal half of upper surface beaded, its inner surface completely covered with vesicular granules, and its under surface smooth: the wrist and hand are quite smooth, the hand of the adult male being as broad as long: the fingers are stout, as long as the hand, and meet only at tip: the dactylus in the male has one of its teeth—situated near the middle—of very conspicuous size; the fingers in the female are without teeth.

The true legs exceed the arm in length almost by their last two joints.

The male abdomen resembles that of the last species, and its long second piece has a stout tooth at its extreme distal end.

The carapace of the male measures 7·5 by 6·5 millim., that of the female 8 by 7 millim.

Colours in spirit: uniform yellowish pinkish brown.

In the Indian Museum collection are 2 males (one adult) and 6 females (four ovigerous) from the Andamans, and an adult male from off Cape Comorin, 39 fathoms.

77. *Pseudophilyra pusilla*, Henderson.

Pseudophilyra pusilla, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 398, pl. xxxvii. figs. 13–15.

Differs from *Pseudophilyra wood-masoni* in the following particulars only:—

1. Its size is even more diminutive, the carapace of the largest male in the Indian Museum—an undoubted adult—measuring 6 by 5 millim.

2. The edge of the front is straight, slightly deflexed and concave in the middle line, this deflexed portion being again produced horizon-

tally forwards as a median tooth. Posteriorly a faint carina runs straight backwards from the front, separating the hepatic regions, much as in *P. tridentata.*

3. The tooth on the third thoracic sternum, on either side of the abdomen, though more outstanding, is much shorter, projecting forwards only about halfway across the second sternum.

4. The chelipeds of the adult male are not more massive than usual, the arms being only about a quarter as broad as long, and the hands being more than half again as long as broad.

5. The fingers in the adult male, as in the female, are almost smooth, and there is no big tooth near the middle of the mobile finger.

6. There is but the faintest trace of a denticle on the male abdomen, in the middle line.

7. The colours are altogether different, even in a specimen that has been over 20 years in spirit in the same bottle with specimens of *P. wood-masoni.*

In good spirit specimens the dorsal surface is light grey with elegantly speckled markings of various shades of greenish and yellowish brown, as follows:—a band across the tip of the front: a V-shaped collar at base of front: a crescent on either branchial region, joining a stripe down the middle of the postgastric and cardiac regions, the whole looking like a scorpion with extended chelæ: a broad band across middle of arm and a narrow band across distal end of arm: a broad band across middle of hand, and a narrow stripe along both fingers. The ventral surface of the external maxillipeds and the tip of the abdomen closely speckled and mottled with dark brown.

Locality—Andamans, whence the Indian Museum collection has 3 adult males.

The foregoing three species have more the general facies of *Leucosia* than of *Philyra.*

78. *Pseudophilyra blanfordi*, n. sp. Plate VI. fig. 7.

Carapace circular, its dorsal surface defined all round behind the eyes by a finely beaded line; its regions are tumid and well demarcated, the tumid surfaces being very distinctly granular (excepting the front part of the gastric region) in the male, but in the female more punctate than granular. The front is distinctly pinched off at base from the hepatic regions, as in all the species of *Leucosia* except *L. truncata*, and as in all other species of *Pseudophilyra*: it is divided into two rather tumid lobes by a longitudinal groove that extends almost to its base: its anterior edge is straight, and projects just beyond the edge of the epistome.

In the male the whole surface of the sternum, except the segment belonging to the external maxillipeds, as also the pterygostomian region and extreme base of abdomen, is finely beaded, and the surface of the exognath is granular: in the female the outer border of the endognath also is granular, and the basal abdominal terga.

The exognath is not dilated in any part, and the buccal cavern is narrowed in front and is at least as long as broad.

The chelipeds in the male are less than twice, though more than $1\frac{1}{2}$ times, the length of the carapace; in the adult female they are not much longer than the carapace. The arms are cylindrical and are roughly granular everywhere except a very small part of the under and of the inner surface. The upper surfaces of the wrist and hand are slightly granular along the inner half. The hand is not greatly longer than broad. The fingers are as long as the hand, and are strongly bent inwards, much as in *Philyra globulosa*, Edw. On the immobile finger in the male there is a strong tooth, and on the opposed edge of the mobile finger a notch, beyond which the opposed edges are denticulate.

The abdomen of the male consists of 3 pieces, including a linear basal piece and a small apical piece : on the large middle piece the 6th tergum is marked by a shallow groove, and bears a stout median tooth at its distal border.

Diameter of carapace of male between 7 and 8 millim., of female the same.

Two males and four ovigerous females from the Mekrán Coast, 25 fathoms.

This little species bears a considerable resemblance to *Philyra adamsii*, Bell; but may be distinguished by its perfectly circular and strongly convex carapace, by its short chelipeds, and by the stout tooth on the abdomen of the male.

79. *Pseudophilyra melita*, de Man.

Pseudophilyra melita, de Man, Journ. Linn. Soc. Zool., Vol. XXII. 1888, p. 199: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 397.

Carapace in the adult almost circular, moderately convex; its dorsal surface defined all round, behind the front, by an elegantly beaded line; its surface, to the naked eye, smooth and polished.

The hepatic regions are defined by a slight dorsal acuminate bulge, or wrinkle.

The anterior margin of the front, which does not reach the level of the anterior margin of the buccal cavern, is concave and deflexed in the middle line, so as to appear somewhat bilobed, but the deflexed

concave portion is horizontally produced to form an acute tooth, the tip of which projects beyond the margin of the buccal cavern.

In the male the sternum is elegantly beaded along the anterior and lateral borders, and round the line of contact with the tip of the abdomen: in the female only the anterior border is beaded.

The chelipeds in the adult male are nearly twice the length of the carapace: the arms are cylindrical, and have the upper surface in its proximal half or two-thirds beaded in longitudinal lines; the under surface is granular, except at the distal end and along the outer border: wrist smooth: hand half again as long as broad in the adult male, about twice as long as broad in the female; its inner surface, in old males only, with numerous vesicular granules: fingers in both sexes as long as the hand is broad, meeting only at tips, and having the opposed edges distantly and inconspicuously dentate.

The first pair of true legs exceed the arm in length by their dactylus.

The abdomen of the male is narrowly triangular, and is devoid of any median denticle: it consists of 5 pieces, but the joint between the 3rd and 4th pieces is rigid.

The carapace of the male is 11 millim. long and 10 millim. broad; that of the female is slightly larger.

Colours in spirit: pearly grey with numerous darker mottled markings. The confluent gastric and cardiac regions are defined by a brown line, which forms with an ill defined ring of the same colour on either branchial region a pair of spectacles; the hepatic regions edged with brown: broad cross-bands of brown across middle of arm, base of hand, and middle of fingers; wrist brown: legs with yellowish brown cross-bands.

Common along Coromandel coast. Also from Mergui.

This species has more the facies of *Philyra* than of *Leucosia*.

Myrodes, Bell.

Myrodes, Bell, Trans. Linn. Soc. Vol. XXI. 1855 p. 298, and Cat. Leucos. Brit. Mus. p. 13.

Myrodes, Miers, 'Challenger' Brachyura, p. 297.

Closely resembles *Myra* in all details of form, but differs conspicuously in the following characters:—

(1) the chelipeds are much shorter, their length being hardly $1\frac{2}{3}$ times that of the carapace:

(2) the hands are not $\frac{1}{4}$ longer than broad and are inflated and subglobular:

(3) the fingers are much longer than the hand, are extremely slender and not much compressed, and are of about the same diameter

from their base to near their hook-like tip: the tip of the dactylus moves through an arc of over 120°.

(4) the merus of the external maxillipeds is hardly more than half the length of the ischium measured along its inner border.

80. *Myrodes eudactylus*, Bell.

Myrodes eudactylus, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 299, pl. xxxii. fig. 6, and Cat. Leucos. Brit. Mus. p. 13.

Myra eudactyla, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 46, pl. iii. fig. 3: Haswell, Cat. Austral. Crust. p. 123.

Myrodes gigas, Haswell, P. L. S., N. S. Wales, Vol. IV. 1880, p. 52, pl. v. fig. 5.

Myrodes eudactylus, Miers, 'Challenger' Brachyura p. 298: A. Ortmann, Zool. Jahrbuch., Syst. etc., VI. 1892, p. 576.

Carapace convex, longitudinally-ovoidal, with a carina—indistinct or obsolete in large adults—down the middle line; its surface generally smooth to the naked eye in large adults, but with numerous scattered bead-like granules in the young; its short posterior margin with a petaloid tooth at either end, and overhung in the middle line by a horizontal recurved spine; its lateral margins defined by a finely-beaded line.

The front is truncated and broadly bidentate, and the subhepatic region forms an independent facet, the raised pterygostomian edge of which ends posteriorly at a sharp tooth. Between the hepatic and branchial regions, on either side, is a shallow notch which is in continuity with a longitudinal groove in the side wall of the carapace.

The external maxillipeds are closely scabrous, especially distally.

The chelipeds are hardly $1\frac{2}{3}$ times the length of the carapace (without spine), and though generally smooth to the naked eye in the adult, have, in the young, the base of the arm, the outer edge of the wrist, hand and dactylus, and the inner two-thirds of the upper surface of the hand finely but distinctly granular: the arm is subtrigonal, and the hand subglobular but much smaller at the distal end than at the base: the fingers are slender and hook-like, much longer than the hand, finely granular, of almost the same diameter from the base to the hook-like tip, and are armed on the opposed edges with fine teeth with larger lancet-like teeth at distant intervals: the movable finger opens in a horizontal plane, but it moves through an arc of between 120° and 130°.

The legs are slender, and have both edges of the dactylus, and the dorsad edge of the propodite, fringed with close shortish stiffish hairs.

The abdomen of the male is four-jointed, the penultimate piece carrying a subterminal denticle: that of the female consists of 5 separate pieces.

Numerous specimens—adults and young of both sexes—from the Andamans.

Iphiculus, Adams and White.

Iphiculus, Adams and White, 'Samarang' Crustacea p. 57.

The whole body and its appendages, except only the fingers, covered with a dense spongy or woolly tomentum, beneath which, when denuded, the surface is rough granulous or pustulous, and beneath which the regions of the carapace—especially the cardiac and intestinal—are demarcated by grooves.

Carapace transversely somewhat oval, its lateral margins spinate.

The front is narrow and is sunk behind the level of the edge of the buccal cavern, and appears still more sunken because the hepatic and sub-hepatic regions are puffed out beyond it at the sides and in front.

The orbits are obliquely elongate and completely conceal the eyes, in the denuded carapace three sutures can be made out in the emarginate roof. There is a gap at the inner canthus in which stands the basal joint of the antenna, the largish flagellum of which appears to be inside the orbit. The antennules fold very obliquely. There is a broad vertical space between the lower edge of the orbit and the edge of the buccal cavern.

The buccal cavern is triangular: the merus of the external maxillipeds is half the length of the ischium measured along the inner border.

The chelipeds are about $1\frac{2}{3}$ the length of the carapace: the hand is short and globular: the fingers are slender and hook-like, much longer than the hand, and open in a somewhat oblique plane, the tip of the mobile finger moving easily through an arc of 120°. Legs rather large.

Abdomen of male with the 3rd and 4th segments fused: that of the female with all the segments distinct.

81. *Iphiculus spongiosus*, Adams and White.

Iphiculus spongiosus, Adams and White, 'Samarang' Crustacea, p. 57, pl. xiii. fig. 5: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161: Miers, Zool. H. M. S. 'Alert' pp. 185, 253.

Carapace convex, transversely ovoidal, much broader than long, the surface when denuded of its woolly covering granulous with numerous larger pustulous tubercles, and showing the cardiac and intestinal regions tumid and very well demarcated by grooves. On the antero-lateral margins are four large coarse close spines, increasing in size from before backwards; on the postero-lateral margins are two coarse dentiform tubercles separated by a wide interval.

The broad front is coarsely bilobed : there is a strong tooth at the outer angle of the orbit against which the retracted eye impinges, and another at the outer angle of the buccal cavern, on either side—only visible on the denuded carapace.

Except that they are densely tomentose up to the base of the fingers, and that the fingers are even more slender, the chelipeds are a repetition of those of *Myrodes*.

In the Indian Museum are numerous specimens, from the Andamans, the Mekrán Coast, and from the Bay of Bengal up to 65 fms.

Pariphiculus, n. gen.

Closely allied to *Iphiculus*, but differing in several important characters and in the whole form of the carapace. The appendages are as densely tomentose as in *Iphiculus*, but the carapace is covered with a finer and sparser tomentum which does not quite conceal the texture of the surface.

The carapace is circular and globular, with its margins coarsely spinate, and its surface vesiculous : the intestinal region is very distinctly isolated, but the other regions are almost lost in the general convexity of the carapace.

The front is narrow : in one species it projects as a distinct snout, in the other the angle of the afferent branchial canal can be seen beyond it in a dorsal view, but the whole mouth can never be seen beyond it as it can in *Iphiculus*.

The orbits are obliquely elongate and completely conceal the eyes : two distinct fissures are plainly visible in the emarginate roof besides a fissure in the lower part, and there is a gap at the inner canthus where the basal joint of the antenna—the flagellum of which is large—stands. The antennules fold very obliquely. There is a space of varying width between the edge of the orbit and the edge of the buccal cavern.

The buccal cavern is rather elongate triangular, and the merus of the external maxillipeds is half the length of the ischium measured along the inner border.

The chelipeds are from $1\frac{1}{4}$ to $1\frac{2}{3}$ times the length of the carapace : the hand is short, cylindrical with the base inflated, or is subglobular, but not nearly so swollen as in *Iphiculus* or *Myrodes* : the fingers are slender, much longer than the hand and somewhat hooked ; they open in an obliquely vertical plane, and the tip of the mobile finger moves through the usual arc of about 75°. The legs are moderately stout. The abdomen of the male has the 3rd, 4th and 5th segments fused : that of the female has all the segments distinct.

Key to the Indian species of Pariphiculus.

I. Carapace a little broader than long: front not at all prominent: a spiniform tubercle on the cardiac region between one on either branchial region: chelipeds about $1\frac{2}{3}$ the length of the carapace ..... *P. coronatus.*

II. Carapace longer than broad: front markedly prominent: cardiac region and branchial regions immediately on either side of it unarmed: chelipeds about $1\frac{1}{4}$ the length of the carapace ..... *P. rostratus.*

82. *Pariphiculus coronatus*, Alcock & Anderson.

Randallia coronata, Alcock & Anderson, J. A. S. B., Vol. LXIII. pt. 2, 1894, p. 177.

Pariphiculus coronatus, Alcock & Anderson, Ill. Zool. 'Investigator,' Crust. pl. xxiv. fig. 2 (*in the press*).

Carapace globular, just broader than long, its surface closely covered with large vesiculous granules beneath a dense fine-textured pubescence: the intestinal region forms an independent circular swelling, bounded by a deepish groove, and surmounted by two spiniform tubercles, one behind the other: the gastric region is partly defined anteriorly by two creases, and the cardiac region is partly defined posteriorly by two grooves, and a narrow and indistinct groove separates the hepatic from the branchial region on either side: on either lateral margin are 5 spiniform tubercles, not including the dentiform prolongation of the outer angle of the buccal cavern, and at either end of the short posterior margin is a dentiform tubercle: 3 similar tubercles occur, one in the middle of the cardiac region and one on either side of it on the after part of the branchial regions—these three, along with the last on the lateral borders and the two on the posterior margin, forming a ring round the tumid intestinal region: the side-wall of the carapace is grooved longitudinally just above the epimeral edge.

The front is bidentate, its tips just projecting beyond the level of the buccal cavern.

The chelipeds in the female (male unknown) are $1\frac{2}{3}$ times the length of the carapace: the hand is inflated, cylindrical, and about $\frac{3}{4}$ the length of the fingers: the fingers are very slender, almost hairless, hooked at tip, finely denticulate with a few slightly larger denticles at distant intervals, and they open in an obliquely vertical plane.

Length of carapace of female (apparently adult) 16 millim., breadth 17 millim.

Loc. Bay of Bengal, off Coromandel coast, 112 fms.

83. *Pariphiculus rostratus*, n. sp. Plate VIII. fig. 2.

Carapace globular, a little longer than broad, with the front prominent and projecting in the form of a snout; its surface covered with very small, distant vesicles, beneath a dense fine pubescence: the intestinal region exactly resembles that of *P. coronatus*, and the gastric and cardiac regions are incompletely defined in the same way: on either lateral border are six sharpish tubercles, the first of which—situated about the middle of the pterygostomian ridge—and the third—situated near the anterior limit of the branchial region—are enlarged and spiniform: at either end of the short posterior margin is a dentiform tubercle: the side-wall of the carapace is traversed longitudinally by two grooves, one just above the epimeral edge, the other just below the lateral margin, and the surface between the grooves is tumid.

The very prominent front is sharply bidentate, the tips of the teeth being somewhat sharpened and thickened: the space between the edge of the orbit and the edge of the buccal cavern is much reduced.

The chelipeds are similar in both sexes and are about $1\frac{1}{4}$ times the length of the carapace, sometimes less than this: the hand is subglobular but not so swollen as in *Iphiculus* and is only about half the length of the fingers: the fingers are slender, hooked at tip, and finely denticulate, the denticulations, however, being obscured by a thick growth of short colourless hairs; they open in an obliquely vertical plane.

The largest specimen—an apparently adult female—has the carapace 32 millim. long and 27 millim. broad.

Loc. Off Malabar coast 28 to 45 fms., off Coromandel coast 25 to 30 fms., on soft muddy bottoms.

Nursilia, Bell.

Nursilia, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 308, and Cat. Leucos. Brit. Mus. p. 20.

Carapace broader than long, bluntly polygonal, with the lateral borders sharp, thin, laminar, somewhat turned up, and with the surface broken by some definitely-placed ridges and distant spines. Front prominent, bidentate: orbits with two distinct sutures, their lower edge not distinct from the edge of the buccal cavern. Antennæ with longish flagella, their basal joint occupying the very much restricted space between the eye and the obliquely folding antennules.

Buccal cavern elongate-oval, the hairy tips of the external maxillipeds projecting beyond the edge of the buccal cavern: the merus much hidden in hair (more so than in *Ixa*) and considerably less than half the length of the ischium.

Chelipeds somewhat slender, about half again as long as the carapace: hands swollen, especially towards the inner side and the base: fingers much longer than the hand, slender, hook-like; the tip of the dactylus moves through an arc of more than 130°.

In the abdomen of both sexes all but the first and last segments are intimately fused.

As the name indicates, this form has the carapace and front shaped very much as in *Nursia*, though approaching *Ilia*—or rather *Myrodes*—in the form of the chelipeds and mouth-parts.

84. *Nursilia dentata*, Bell.

Nursilia dentata, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, pl. xxxiv. fig. 6, and Cat. Leucos. Brit. Mus. p. 20: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 161: Haswell, P. L. S., N. S. Wales, IV. 1879, pp. 56, 404, and Cat. Austral. Crust. p. 128: Miers, Zool. H. M. S. 'Alert,' pp. 158, 253, 518, 548: R. I. Pocock, Ann. Mag. Nat. Hist. (6) V. 1890, p. 73.

Carapace broader than long, distinctly polygonal in the male, but with the angles more rounded off in the female. The lateral margins are thin, sharp, slightly turned up, and sinuous (laciniate in the young): the ends of the short posterior margin are dentiform in the male, but indistinctly so in the female.

The carapace is traversed by a longitudinal carina, on the posterior half of which are 3 large vertical spines with the tips often curved forwards: an oblique ridge ending in a sharpish tooth separates the gastric from the hepatic region on either side: another oblique ridge, with a sharpish tooth at each end, runs across the after part of the branchial region to the postero-lateral margin on either side: there are always one or two teeth on either side of the longitudinal carina in the gastro-cardiac region. In the young the oblique gastro-hepatic ridge is connected by a longitudinal ridge with the oblique branchial ridge, the branchial ridges more or less meet across the carapace, and the spines are more numerous and more distinct.

The chelipeds have the arm very sharply trigonal: the fingers are slender and hook-like and are twice the length of the much swollen hand: they are finely denticulate with enlarged teeth at distant intervals, and as in *Myrodes*, the dactylus is remarkable for the great range of its mobility.

Adult females have the carapace about 9 millim. long and about 10·5 millim. broad: adult males are a good deal smaller.

A large number of specimens are in the Indian Museum Collection, from the Andamans, from off Ceylon at 32 to 34 fms., from the Madras coast in the neighbourhood of Palk Straits, from off the Malabar coast at 26 to 31 fms., and from off the Maldives at 20 to 30 fms.

85. *Nursilia tonsor*, n. sp.

This species is distinguished (1) by its smaller size,—ovigerous females having the carapace only 7 millim. long and 7·25 millim. broad, and adult males being a good deal smaller: (2) the gastro-cardiac region is defined posteriorly on either side by an oblique dentigerous ridge, which meets the oblique ridge that traverses either branchial region at an obtuse angle—the whole forming a sharply defined W reversed: (3) the hand is less swollen and the outer edge of the fingers is cristiform—the cristiform lamina being of extreme thinness and delicacy: (4) the serrations of the lateral margins and the ridges and spines of the carapace are all much sharper-cut.

Loc. Andaman Sea up to 40 fms., off Ceylon 34 fms.

Heterolithadia, Wood-Mason, (name only).

Carapace broader than long, transversely somewhat oval, its surface nodular, coarsely granular, convex except the hepatic regions which are hollowed; all the regions well delimited by grooves.

Front distinct, moderately prominent, broadly bidentate. Orbits with very indistinct sutures in the outer wall, and with very little space between their lower edge and the edge of the buccal cavern. The antennules fold obliquely. The antennæ have a short flagellum and occupy the much restricted space between the antennules and the eye.

Buccal cavern triangular with the sides curved somewhat as in *Nursilia*: merus of external maxillipeds half the length of the ischium measured along the inner border.

Chelipeds stout, about half again as long as the carapace: hand very short, swollen, half the length of the fingers: fingers slender, of nearly the same diameter from base to near the hook-like tip, opening in a nearly vertical plane, the tip of the dactylus being movable through an arc of about 75°.

The abdomen of the male has the 3rd–6th segments fused.

Heterolithadia has a strong external resemblance to *Lithadia*, but has the *Ilia* fingers and external maxillipeds. Its nearest ally is *Nursilia*.

86. *Heterolithadia fallax*, (Henderson).

Ebalia fallax, J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 402, pl. xxxviii. figs. 4–6.

The posterior half of the carapace is a segment of a broad ellipse, the anterior half is broadly triangular.

The carapace is broader than long, and its surface, like the whole under surface of the body and the whole surface of the arms, is closely covered with large flat-topped pearly granules, except in the deeply-excavated hepatic areas where the granules are small and rather distant.

The regions are well demarcated by grooves, and (except the hepatic regions, which are markedly excavated inside of the rather prominent antero-lateral borders) are tumid. A broadish median ridge extends from the front to near the middle of the cardiac region, where it ends in a stout tubercle, and in continuation of the same line, on the intestinal region, are two similar tubercles: there are also four similar tubercles on the gastric region,—two on either side of the median ridge.

The front is broadly bidentate: behind it the pterygostomian ridge, which ends at a coarse denticle, can be seen in front of the antero-lateral margin in a dorsal view: the hepatic portion of the antero-lateral margin is thickened and ends abruptly at a very prominent granular swelling; behind this the lateral margin is most elegantly curved. The posterior margin is rather prominent and is bilobed, the apex of one of the intestinal tubercles being seen between the lobes in a dorsal view.

The chelipeds are rather more than half again as long as the carapace: the arm is coarsely granular like the carapace, the wrist and hand are granular under the lens: the hand has the outer edge somewhat thickened and raised and the inner side swollen: the fingers are hooked, are twice the length of the hand, and open in a nearly vertical plane; their opposed edges are finely denticulate with larger denticles at distant intervals and with a good many hairs.

The abdomen of the male has a tooth at the penultimate segment.

In the Indian Museum is a specimen from the Andamans and one from the Orissa Coast.

Arcania, Leach.

Arcania and *Iphis*, Leach, Zool. Miscell. III. p. 19.
Arcania and *Iphis*, Milne Edwards, Hist. Nat. Crust. II. 133, 138.
Arcania and *Iphis*, Bell, Trans. Linn. Soc., Vol. XXI. 1859, pp. 309, 311, 312.
Arcania, A. Milne Edwards, Nouv. Archiv. du Mus. X. 1874, p. 48.
Arcania, Miers, 'Challenger' Brachyura, p. 299.

Carapace globular, ovoid, or rhomboidal, with the lateral and posterior margins armed with definitely-situated large spines (except in *Arcania gracilipes* Bell, in which large tubercles take the place of spines, and *A. orientalis* Miers, in which spines are absent), and with

the surface, usually, crisply granular, spiny, or tubercular, but sometimes almost smooth to the naked eye.

Front bilobed and prominent, or if not prominent then distinctly pinched off from the gastric and hepatic regions.

Orbits with three sutures in the upper and outer wall, with a cleft in the inner wall, and usually with the inner canthus prolonged into a spine: eyes small.

The antennules fold very obliquely. The antennæ are small, and their basal joint loosely fills the cleft in the inner wall of the orbit.

The buccal cavern is elongate-triangular: the external maxillipeds have the ischium from $2\frac{1}{2}$ to 3 times the length of the bluntly-triangular merus: their exognath is narrow, with the outer border nearly straight.

The chelipeds are very slender and are usually about twice the length of the carapace—either a little more or a little less; their joints are cylindrical, the palm alone being a little swollen at base: the fingers are long and very slender, their opposed edges being finely ctenoid, with larger denticles at long intervals; they open in a nearly vertical plane.

The legs are slender.

The abdomen of the male usually consists of 5 pieces, that of the female of 4 or 5.

Key to the Indian species of Arcania.

I. Margins of the carapace with spines, hepatic regions dorsally convex: abdomen of adult male consisting of 5 pieces:—

1. Fingers longer than the hand: surface of carapace either smooth (microscopically granular), or with small granules all of one size:—

i. Lateral median epibranchial spines nearly straight, far longer than any of the other spines, their length often being equal to the breadth of the carapace:—

a. Seven spines on margins of carapace,—3 very large, 4 smaller..... *A. septemspinosa,* (*Fabr.*)

b. Five spines on margins of carapace,—3 very large, 2 smaller ..... *A. quinquespinosa.*

ii. Median lateral epibranchial spines claw-like, not longer than the spines on the posterior part of the carapace, their length being not a quarter the breadth of the carapace :—

a. Nine spines on margins of carapace,—3 large and 6 smaller: regions of carapace very ill-defined — *A. novemspinosa.*

b. Eleven spines on margins of carapace,—none of them very large : regions of carapace well defined ..... — *A. undecimspinosa.*

2. Fingers shorter than the hand : surface of carapace covered with spines, or with granules and larger tubercles :—

i. Carapace longer than broad : chelipeds less than twice the length of the carapace :—

a. Carapace densely spiny : eleven large marginal spines ..... — *A. erinaceus.*

b. Carapace with granules and claviform tubercles : eleven marginal prominences, of which only 4 or 5 can be called spines — *A. tuberculata.*

ii. Carapace broader than long : chelipeds a little over twice the length of the carapace : carapace with granules and large tubercles ..... — *A. pulcherrima.* (=*A. septemspinosa*, Bell.)

II. Margins of carapace with large tubercles in place of spines, hepatic regions dorsally sunken and flat : abdomen of adult male consisting of 4 pieces, and the second piece sunk almost out of sight ..... — *A. gracilipes.*

87. *Arcania septemspinosa*, (Fabr.), Leach, Edw.

Cancer septemspinosus, Fabr., Mant. Ins. I. 325, and Ent. Syst., II. 463: Herbst, Krabben, I. ii. 259, pl. xx. fig. 112.

Leucosia septemspinosa, Fabr., Ent. Syst. Suppl., p. 351: Bosc, Hist. Nat. Crust. I. 237: Latreille, Hist. Nat. Crust. et Ins. VI. 119.

Iphis septemspinosa, Leach, Zool. Miscell. III. p. 25: Desmarest, Consid. Gen. Crust., p. 170: Milne Edwards in Cuvier Règne Animal, Crust., pl. xxv. fig. 4, and Hist. Nat. Crust. II. 139: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311, and Cat. Leucos. Brit. Mus. p. 22: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 161: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317: Sluiter, Tijdschr. Nederl. Ind. XL. 1881, p. 159, fig. 1.

Arcania septemspinosa, Miers, 'Challenger' Brachyura, p. 300: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 403.

Carapace bluntly rhomboidal, the anterior blunt angle of the rhomb forming the elegantly bilobular, slightly projecting, front, and the lateral and posterior angles being all produced to form huge slightly-curved spines—the lateral ones being the longest. Besides these, there are four other smaller spines in the posterior part of the carapace, namely one on either side at the level of, and one on either side below, the large posterior spine. The surface of the carapace is finely granular in irregular patches, the granules being most distinct on the large spines. The hepatic regions are separated from the branchial regions on either side by a transverse crease or pucker, but otherwise the regions of the carapace are not clearly demarcated. The summit of the (antero-lateral) convexity of the hepatic region is, usually, faintly acuminate. The chelipeds are symmetrical and slender, and are more than twice the length of the carapace (posterior spine excluded) in both sexes: the long cylindrical arms are very finely and uniformly granular: the almost filiform fingers are a little longer than the slender tapering hand. The true legs are slender and smooth, and the dactyli are thickly fringed with rather long hair: the first pair exceed the arm in length by their dactylus and rather more than half their propodite.

Colours streaky and patchy red.

The carapace of an average adult of either sex is about 20 millim. long, and about 20 millim. broad.

Localities: Andamans, Arakan, Gangetic and Máhánaddi Deltas, Madras coast, Persian Gulf. It is commonest on muddy bottoms at about 25 fathoms.

Of 92 specimens in the Indian Museum the lateral spines are found to vary a good deal in length: they are usually, in adults, about as long as the arm, and sometimes a good deal longer; but in the young they are usually much shorter than the arm.

88. *Arcania quinquespinosa*, Wood-Mason MS. name, Alcock and Anderson.

Arcania quinquespinosa, Alcock and Anderson, J. A. S. B., Vol. LXIII. pt. 2, 1894, p. 206, and Ill. Zool. R. I. M. S. "Investigator," Crust., pl. xxiv. fig. 6 (*in the press*).

? *Arcania septemspinosa*, var. *gracilis*, Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, pp. 403, 404.

Differs from *A. septemspinosa* (Fabr.) only in the following particulars:—

1. It is a much smaller species, the carapace of the adult being less than 12 millim. long, and less than 14 millim. broad.

2. The outline of the carapace is broadly conical, owing to the bulging, obliquely backwards, of the branchial regions.

3. The front is sharply bidentate, instead of bilobular.

4. The large spines of the margins of the carapace are relatively smaller, and the spine on the postero-lateral border, on either side, is either altogether wanting or is represented only by a granule.

5. The regions of the carapace, with the single exception of the boundary between the gastric and cardiac regions, are distinctly delimited by fine grooves.

6. The fingers are nearly twice the length of the hand.

7. The cardiac region in life, and even in fresh spirit specimens, shows as a large bright red milk-white-edged ocellus. The rest of the carapace is delicate pink in life.

In the Indian Museum collection are 27 specimens—chiefly adult males and egg-laden females—from the coasts of Arakan, Ganjam, Vizagapatam, Ceylon, and the Persian Gulf.

89. *Arcania undecimspinosa*, De Haan.

Arcania undecimspinosa, De Haan, Faun. Japon. Crust., p. 135, pl. xxxiii. fig. 8: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 21: Miers, Zool. H. M. S. 'Alert' pp. 518, 548: (?) A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1890, p. 111: Ortmann, Zool. Jahrbüch., Syst. etc., VI. 1892, p. 577: J. R. Henderson, Trans. Linn. Soc., Zool. (2) V. 1893, p. 404.

Arcania granulosa, Miers, Trans. Linn. Soc., Zool., (2) I. 1875–79, p. 240, pl. xxxviii. fig. 29 (*fide* Miers, P. Z. S. 1879, p. 44): Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131.

? ? *Arcania novemspinosa* var. *aspera*, Miers, Ann. Mag. Nat. Hist (5) V. 1880, p. 317.

Carapace longitudinally ovoid in the male, nearly globular in the adult female, uniformly covered either with rather distant miliary granules or with close-set short prickles, amid which the fine smooth grooves that define the regions of the carapace are very distinct,—the

only one wanting being that between the gastric and cardiac regions. The margins of the carapace are armed with eleven spines of moderate size, situated as follows:—one, pointing obliquely forwards, in either antero-lateral border, at the culmination of the sub-hepatic region; one on either side just behind the groove that separates the hepatic from the branchial region; one, claw-like, at either (median) lateral epibranchial angle; one, pointing obliquely backwards, just abaft the middle of either postero-lateral border; one at either end of the posterior border; and one, pointing straight backwards, in the middle of the intestinal region. The front ends in two sharp-cut laminar teeth.

The slender chelipeds, in the adult male, are just over twice the length of the carapace (spine excluded); the arm is usually, but not always, covered in all or the greater part of its extent with miliary granules similar to those on the carapace; the almost filiform fingers are as long as the hand and rather more than half the wrist combined. The true legs are slender and smooth; their dactyli are scantily fringed with hair in their distal half: the first pair exceed the arm in length by their last two joints.

The length of the carapace of the adult male is about 16 millim., and the breadth about 14 millim.; of an adult female the dimensions are 18 millim. by 16 millim.

In the Indian Museum collection are young and adults of both sexes, from the Andamans and from the Madras side of Palk Straits.

90. *Arcania novemspinosa*, Adams & White.

Iphis novemspinosa, Adams & White, 'Samarang' Crust. p. 56, pl. xiii. fig. 1.

Arcania novemspinosa, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 21: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131: de Man, Archiv für Naturges. LIII. 1887, i. 392.

Differs from *A. undecimspinosa*, De Haan, only in the following characters:—

1. The surface of the carapace, in the adult, is almost smooth—at any rate is without isolated miliary granules or prickles.

2. The marginal spines are very much larger, with the single exception of the spine on either side situated at the junction of the sub-hepatic and branchial regions, which is a mere denticle or granule.

3. With the exception of a faint groove between the hepatic and branchial regions, and of a still more indistinct break of level between the branchial and intestinal regions on either side, the regions of the carapace are not defined.

4. The front is more prominent.

5. The chelipeds in the adult male are $2\frac{1}{2}$ times the length of the carapace, and the arm is only very finely granular, and at the base only.

6. The carapace in the adult male is a little more elongate.

Two adult males and a half-grown female from the Andamans are in the Indian Museum collection.

The differences above noted are plain enough in extreme forms, but their *sum* is not constant, as it is in the case of the differences between *A* 7-*spinosa* and *A.* 5-*spinosa*, so that it seems doubtful whether *A.* 9-*spinosa* is really distinct from A. 11-*spinosa*.

91. *Arcania erinaceus*, (Fabr.)

Cancer erinaceus, Fabricius, Mantiss. Insect. I. 325, and Ent. Syst. II. 460: Herbst, Krabben, I. ii. 258, pl. xx. fig. 111.

Leucosia erinaceus, Fabr., Ent. Syst. Suppl. p. 352: Latr., Hist. Nat. Crust. et Ins. VI. 119.

Arcania erinaceus, Leach. Zool. Miscell. III. p. 24: Desmarest, Consid. Gen. Crust., p. 170, pl. xxviii. fig. 1: Milne Edwards in Cuvier Règne An., Crust., pl. xxiv. fig. 2, and Hist. Nat. Crust. II. 134: Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 309, and Cat. Leucos. Brit. Mus. p. 20.

Carapace globular, everywhere thickly covered with thorns and spine-like granules, amid which the smooth shallow sulci that define the branchial and hepatic regions are visible. Round the margin of the carapace are eleven large spines, similar in position to but larger in size than those of *A. undecimspinosa*, and covered with secondary spinelets. The ventral surface of the external maxillipeds, the thoracic sterna, and the abdominal terga are all also sharply granular. The front ends in two prominent sharp teeth.

The chelipeds and the true legs have their meropodites covered with thorns, and the other joints—except the dactyli, the distal half of the hand, and the fingers—sharply granular. The chelipeds, even in the adult male, are only about $1\frac{2}{3}$ times the length of the carapace (spine excluded), and the fingers are a little shorter than the palm. The first pair of true legs exceed the arms in length by their last $2\frac{1}{2}$ joints.

The carapace of the adult male is 16 millim. long and 14 millim. broad; that of the adult female is 21 millim. long and 19 millim. broad.

Loc. East coast, from the Hooghly to Pondicherry. In the Indian Museum collection are an adult male and a young and three adult females.

92. *Arcania tuberculata*, Bell.

Arcania tuberculata, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, pl. xxxiv. fig. 8, and Cat. Leucos. Brit. Mus. p. 21.

? *Arcania lævimana*, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, pl. xxxiv.

fig. 10, and Cat. Leucos. Brit. Mus. p. 22: A. Milne Edwards, Nouv. Archiv. X. 1874, p. 48, pl. iii. fig. 4.

Carapace subglobular with an abruptly prominent bidentate front; closely covered everywhere, except in the anterior half of the front, with elongate granules some of which are large and claviform. The regions of the carapace are fairly well defined. In the position of the marginal spines of *A. undecimspinosa* there are 11 marginal prominences, of which only 4 or 5 in the posterior part of the carapace deserve the name of spines, the others being denticles not vastly larger than the enlarged claviform tubercles of the dorsal surface. These spines and denticles are covered with secondary granules in all or part of their extent.

The chelipeds, even in the adult male, are not $1\frac{2}{3}$ times the length of the carapace: the arms are elegantly granular; the wrists have a few granules and, on their outer surface, a tooth; the hands are nearly smooth: the fingers are little shorter than the hand.

The legs are slender and perfectly smooth.

The carapace of the adult male is 8 millim. long and 6 millim. broad, that of the adult female is 10 millim. long and 9 millim. broad.

Loc. Andamans and Maldives. In the Indian Museum collection are 11 specimens—young and adults of both sexes, including ovigerous females.

93. *Arcania pulcherrima*, Haswell.

Arcania septemspinosa, Bell *nec* Fabricius, Bell, Trans. Linn. Soc., Vol. XXI. 1855, p. 310, pl. xxxiv. fig. 7, and Cat. Leucos. Brit. Mus. p. 21.

Arcania pulcherrima, Haswell, P. L. S., N. S. Wales, IV. 1879, p. 58, and Cat. Austral. Crust. p. 131: Miers, Zool. H. M. S. 'Alert' p. 253 (*ubi synon.*), and 'Challenger' Brachyura, p. 299 (footnote).

Carapace transversely ovoid, the front not breaking beyond the general outline: its surface everywhere covered with miliary granules, amid which stand out 13 or 14 granule-covered tubercles arranged in five incomplete longitudinal rows. Round the margin of the carapace are 10 granule-covered prominences, the first two of which on either side are mere denticles, while the remaining six are broad spines,—those at the lateral epibranchial angle on either side being much the longest. The regions of the carapace are ill defined. The inner canthus of the orbit is not prolonged into a spine as it is in all the preceding species.

The chelipeds are slender even for the genus, and in the adult male are just over twice the length of the carapace: the arm alone is elegantly granular: the fingers are a little shorter than the hand. The true legs are slender and perfectly smooth.

The carapace of the adult male is about 9 millim. long and 10 broad; that of the adult female is about 10 millim. long and 12 broad.

In the Indian Museum collection are 3 adult males and 2 adult females (one egg-laden) from off Ceylon, 34 fms.

94. *Arcania gracilipes*, Bell.

Arcania gracilipes, Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 310, and Cat. Leucos. Brit. Mus. p. 22: (Haswell. P. L. S., N. S. Wales, Vol. IV. 1879, p. 58?)

Carapace globular, just as broad as long, with the hepatic regions dorsally sunken and flat, so as to throw the front—which does not otherwise project much—into strong relief. The circumference, like the dorsum of the carapace, is armed not with spines, but with numerous large tubercles, which, like the general surface between them, are closely covered with flat discoidal granules: there are altogether about 24 of these large tubercles. The regions of the carapace are fairly well defined. The front ends in two blunt teeth: the inner canthus of the orbit is not prolonged into a spine.

The chelipeds, in the adult male, are slightly over twice the length of the carapace: the arm wrist and hand are elegantly granular like the carapace, the granulation in the case of the wrist and hand being microscopic: the fingers are just equal in length to the hand. The true legs are slender, and are microscopically granular like the hand: the first pair exceed the arm by less than the length of their dactylus.

The abdomen of the male consists of only four pieces, but the second piece is hidden almost out of sight. The carapace of the adult male is 7 millim. long and broad, that of the female 10 millim.

An adult male and 5 females—three ovigerous—from the Andamans.

Ixa, Leach.

Ixa, Leach, Trans. Linn. Soc. Vol. XI. 1815, p. 334.

Ixa, Milne Edwards, Hist. Nat. Crust. II. 134.

Ixa Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311, and Cat. Leucos. Brit. Mus. p. 23.

Ixa, Miers, 'Challenger' Brachyura, p. 300.

Carapace broadly rhomboidal, produced on either side, at the junction of the antero-lateral and postero-lateral borders, into a great sausage-shaped spine of enormous size often with an abruptly acuminate point. The median regions of the carapace are separated on either side from the branchial, either by a broad trench which bifurcates anteriorly to isolate the hepatic regions from the branchial regions and from the front, or by a shallow groove which has similar relations. The

front is broadish and broadly bilobed, and does not project as far as the salient edges of the afferent branchial canal.

The orbits are deep and completely conceal the eyes, their outer wall is marked by 3 closed sutures, the surfaces between which are very convex ; there is a widish gap at the inner canthus where the antennæ with their small flagellum are found. The antennules fold obliquely.

The external maxillipeds are sunk altogether or in part a good deal below the level of the sharp edges of the buccal cavern : they are longitudinally hollowed or grooved along their inner border, the merus more deeply than the ischium : the last-named joint is about twice the length of the narrowly-triangular merus.

The chelipeds are hardly stouter than the slender legs : and are markedly less than twice the length of the carapace : the distal half of the hand is almost filiform : the fingers are hardly half the length of the hand, are filiform, and open in a vertical plane.

The abdomen of the male has the 3rd 4th and 5th segments coalescent, that of the female has the 3rd–6th coalescent.

Key to the Indian species of Ixa.

I. Channels of carapace with very definite undermined edges : lateral processes with very abruptly acuminate tip : buccal frame distinctly triangular : exognaths with the surface concave and almost devoid of granules..... *I. cylindrus.*

II. Channels of carapace simply grooves of no very remarkable appearance : lateral processes gradually tapering : buccal frame quadrangular : exognaths with the surface, in the basal three-fourths, tumid and covered with a mosaic of large granules ..... *I. inermis.*

95. *Ixa cylindrus*, (Fabr). Leach.

Cancer cylindrus, Fabricius, Mantiss. Ins. I. 323, and Ent. Syst. II. 456.

Cancer cylindricus, Herbst, Krabben, I. ii. 109, pl. ii. figs. 29–31.

Leucosia cylindrus, Fabricius, Ent. Syst. Suppl. p. 352 : Bosc, Hist. Nat. Crust. I. 237 : Latreille, Hist. Nat. Crust et. Ins. VI. 119.

Ixa cylindrus, Leach, Trans. Linn. Soc. Vol. XI. 1815, p. 334 : Bell, Trans. Linn. Soc. Vol. XXI. 1855, p. 311 (*part*) : Miers, 'Challenger' Brachyura, p. 301 and footnote.

Ixa canaliculata, Leach, Zool. Miscell. III. p. 26, pl. 129, fig. 1 : Desmarest, Consid. Crust. p. 171, pl. xxviii. fig. 3 : Milne Edwards, Cuvier, Règne An., Crust. pl. xxiv. fig. 1, and Hist. Nat. Crust. II. 135 : A. Milne Edwards, in Maillard's l'Ile Réunion, Annexe F, p. 10.

Ixa megaspis, Adams and White, 'Samarang' Crust. p. 55, pl. xii. fig. 1: Miers, 'Challenger' Brachyura p. 301 (var. of *cylindrus*).

Carapace covered with vesiculous granules between which it is smooth and polished, and there are some largish smooth patches on the branchial regions: the channels of the carapace are deep and very well defined, with undermining edges, and have the floor more or less coated with pubescence: the huge cylindrical lateral processes are of almost the same diameter at their distal end as at their base, and their rounded end is abruptly surmounted by a spine: the distance between the edge of the raised plane of the gastric region and the free edge of the front is nearly equal to the anterior breadth of the front: the ends of the posterior margin are a little thickened and prominent, but are hardly dentiform even in the young.

The buccal cavern, though truncated, has a distinctly triangular shape: the exognath, when denuded of its distal pubescence, is found to have a smooth and longitudinally concave surface, the concavity falling along the inner border; and is seen to fall short of the raised anterior edge of the afferent branchial channel by a mean distance equal to nearly half the length of the merus: the raised outer border of the ischium has a narrow band of vesiculous granules, wanting at the basal end.

Four males and four females (three adult) are in the Indian Museum collection from the Andamans, and from the Madras coast in the neighbourhood of Palk Straits.

The largest female has the carapace 20 millim. long by 60 millim. in extreme breadth.

96. ? *Ixa inermis*, Leach.

Ixa inermis, Leach, Zool. Miscell. III. p. 26, pl. 129, fig. 2: Desmarest Consid. Crust. p. 171: Milne Edwards, Hist. Nat. Crust. II. 135: Haswell, P. L. S., N. S. Wales, IV. 1879, p. 59, and Cat. Austral. Crust. p. 132.

Carapace covered with vesiculous granules between which it is distinctly rough: the channels of the carapace are merely grooves, and are devoid of pubescence: the lateral processes are curved forwards, and taper gradually to a point: the distance between the gastric region (no part of which region has the form of a definitely raised plane) and the free edge of the sharply bidentate front is much less than the anterior breadth of the front: there is a large granular petaloid tubercle at either end of the posterior margin.

The buccal cavern is distinctly quadrangular, owing to the eversion of the outer lip of the afferent branchial channel: the exognath in its basal three-fourths is very strongly convex, the surface of the convexity

being covered with large polished pearly granules polygonal by mutual appression; its hairy distal end is suddenly depressed and does not fall much short of the front edge of the afferent branchial canal: the ischium is grooved along its inner border, but the rest of its surface is tumid and granular just like the exognath.

In the Indian Museum collection is a single female with the carapace 17 millim. long by 42 millim. in extreme breadth, from 23 fathoms off the Orissa Coast.

I believe that this species must be Leach's *Ixa inermis*, as it corresponds with Leach's figure. Unfortunately the mouth-parts are not figured or described. They are most characteristic in this species, which cannot be mistaken for *I. cylindrus*.

Family DORIPPIDÆ.

Dorippiens, Milne Edwards, Hist. Nat. Crust. II. 151 (*partim*).
Dorippidea, De Haan, Faun. Japon. Crust. p. 120.
Dorippidæ, Dana, U. S. Expl. Exp. Crust. pt. I. p. 390.
Dorippidæ, Miers, Challenger Brachyura, p. 326.

Carapace flat, generally broadest behind near the plane of the posterior border, hiding not much more than half of the abdominal terga, the first three of which are commonly visible in a dorsal view quite uncovered. The orbits are somewhat incomplete. The antennules are commonly too large to fold inside their fossettes. The antennæ are large. The mouth-parts somewhat resemble those of the *Calappidæ*: the buccal cavern is prolonged forwards to form an efferent branchial canal which is covered in below by a long lamellar process of the first maxillipeds. The first two pairs of true legs are remarkably long and stout: the last two pairs on the contrary are remarkably short and slender, and occupy a singular position in the dorsal plane of the body. The position of the afferent branchial canal varies. The vasa deferentia perforate the 5th thoracic sternum on either side. The branchiæ are less than nine in number on either side.

The Dorippidæ may be divided into two sections or subfamilies as follows:—

1. *Dorippinæ*, in which the external maxillipeds leave a considerable part of the buccal cavern uncovered, and in which the afferent branchial openings are situated either immediately or shortly in advance of the bases of the chelipeds.

2. *Tymolinæ*, in which the external maxillipeds almost completely cover the buccal cavern, and in which the afferent branchial openings may or may not be situated near the bases of the chelipeds.

The following is a list of known genera, Indian genera being printed in Roman type and genera known to me by autopsy being marked with an asterisk.

Family **Dorippidæ.**

Sub-family I. *Dorippinæ.*

*Dorippe.

*Ethusa (*Ethusina).

? *Cymopolus*, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 27.

Sub-family II. *Tymolinæ.*

Tymolus, Stimpson, Proc. Acad. Nat. Sci. Philad., 1858, p. 163.

Cyclodorippe, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 24.

Cymonomus, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 26.

*Cymonomops.

Uncertain in position.

Corycodus, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880, p. 23.

It appears to me to be quite possible that further investigation may discover *Cyclodorippe* to belong to Stimpson's genus *Tymolus*. Ortmann, (Zool. Jahrbucher, Syst. VI. 1892, p. 559) has already suspected the identity of these two genera.

Caphyra, Guèrin, which was included with the *Dorippidæ* by Milne Edwards, has by other authors been shown to belong to quite another section of the Brachyura; and I cannot think that *Cymopolia* either has any right to be classed with the *Oxystoma*. Previous authors also, such as Dana (U. S. Expl. Exped. Crust. pt. I. p. 403) and Miers ('Challenger' Brachyura p. 334) have suggested the advisability of removing *Cymopolia* from this group.

Key to the Indian Genera of Dorippidæ.

I. The external maxillipeds leave all the anterior part of the buccal cavern uncovered:—

1. The anterior extremity of the buccal cavern passes between the antennules to or even beyond the tip of the front: the afferent branchial apertures are

situated in front of the bases of the chelipeds, a bridge of the carapace intervening ..... DORIPPE.

2. The anterior extremity of the buccal cavern either stops at, or does not reach as far as, the basal joint of the antennules: the afferent branchial openings are situated *immediately* in front of the bases of the chelipeds ..... ETHUSA.

II. The external maxillipeds are greatly elongate and do not leave any appreciable portion of the buccal cavern uncovered: the afferent branchial openings are not situated in front of the bases of the chelipeds ..... CYMONOMOPS.

Dorippe, Fabricius.

Dorippe, Fabricius, Ent. Syst. Suppl. p. 361.
Dorippe, Milne Edwards, Hist. Nat. Crust. II. 154.
Dorippe, Miers, Challenger Brachyura, p. 327.

Carapace very flat, truncate-triangular and broadest behind, covering little more than the first two thoracic sterna, its regions well defined, the hepatic region small.

The front consists of two flat triangular teeth: on either side of it, in the same plane, are (1) a hood-like fold covering the base of the long completely exposed geniculate eyestalks, and separated by a deep narrow fissure from (2) a long flat triangular tooth, formed by the prolongation of the antero-external angle of the carapace, and forming the outer angle of the orbit. The floor of the orbit is even more incomplete than the roof, and is formed almost entirely by the base of a great projecting spine at the inner canthus, but even this spine may be rudimentary. The antennules fold longitudinally, they are too large to fold into the fossettes. The antennæ also are rather large: the basal joint is wedged in between the front and the spine at the inner canthus of the orbit.

The buccal cavern is abruptly narrowed anteriorly and prolonged as a deep well defined canal to, or even slightly beyond, the front: the canal is closed in below by long stout foliaceous processes of the first maxillipeds. The external maxillipeds do not cover this canal: their flagellum or palp arises at the outer angle of the long narrow merus and is completely exposed in flexion. The afferent branchial orifices are oblique pocket-like slits in the pterygostomian region.

The chelipeds in the adult male are commonly unequal, having the hand of one side much enlarged and swollen.

The first and second pairs of true legs are long stout and compressed: the last two pairs on the other hand are short and rather slight; they arise much dorsad of the other legs, and are subchelate,—the four subchelæ being so disposed as to enable the animal to hold over its back — as in a loose frame — some sort of defensive or protective object, such as a lamellibranch shell or an inhabited worm-tube.

The abdomen of both sexes consists of seven distinct segments, the first two and most of the third terga being visible in a dorsal view.

Key to the Indian species of Dorippe.

I. The tips of the foliaceous processes that close the endostomial canal, but never the canal itself, may sometimes be seen between the frontal teeth in a dorsal view :—

1. The greatest length of the carapace is slightly, but distinctly, more than the greatest breadth :—

i. Carapace nodular and wrinkled: spine at the inner canthus of the orbit ponderous, curved, serrated along the under surface: fourth (last) pair of true legs less than half the length of the second (longest) pair ..... *D. dorsipes.*

ii. Carapace smooth: spine at inner canthus of orbit rudimentary: fourth pair of true legs more than half the length of the second..... *D. astuta.*

2. The greatest length of the carapace is less than the greatest breadth: spine at the inner canthus of the orbit long, slender, acute, straight: carapace smooth: fourth pair of legs from a little less than half to one-third the length of the second :—

i. Carapace and last two pairs of legs densely pubescent: both edges of merus and posterior edge of carpus and propodite of 1st and 2nd legs densely pubescent in the male ..... *D. facchino.*

ii. Carapace hardly pubescent: last two pairs of legs very slightly hairy: 1st and 2nd legs perfectly devoid of hair ..... *D. granulata.*

II. The roof of the endostomial canal projects considerably between the bases of the frontal teeth in a dorsal view: the greatest length of the carapace is hardly less than the greatest breadth: carapace smooth, it and all the appendages perfectly devoid of pubescence: spine at inner canthus of orbit rudimentary: last pair of legs much more than half the length of the second (longest) pair..... *D. polita.*

97. *Dorippe dorsipes*, (Linn.) Miers.

Cancer dorsipes, Linn. Mus. Lud. Ulr. p. 452, and Syst. Nat. ed. xii. I. ii. 1053 (*nec syn.*)

Cancer frascone, Herbst, Krabben, I. ii. 192, pl. xi. fig. 70.

Cancer quadridens. Fabricius, Ent. Syst. II. 464.

Dorippe quadridens, Fabricius, Ent. Syst. Suppl. p. 361: Bosc, Hist. Nat. Crust. I. 207: Latreille, Hist. Nat. Crust. et Ins. VI. 125, [and Encycl. pl. 306, fig. 1]: Desmarest, Consid. Crust. p. 135: De Haan, Faun. Japon. Crust. p. 121, pl. xxxi. fig. 3: Stimpson, Proc. Ac. Nat. Sci. Philad. 1858, p. 163: de Man, Journ. Linn. Soc., Zool., XXII. 1888, p. 206.

Dorippe quadridentata, Milne Edwards, Hist. Nat. Crust. II, 156: Hilgendorf, MB. AK. Berl. 1878, p. 812: E. Nauck, Zeits. Wiss. Zool. XXXIV. 1880, p. 49 (*gastric teeth*): Haswell, Cat. Austral. Crust. p. 137.

Dorippe dorsipes, Miers, Zool. H. M. S. 'Alert,' pp. 185, 257: de Man, Archiv. für Naturges. LIII. 1887, i. 393: [Cano, Boll. Soc. Nat. Napol. III, 1889, p. 254]: Ortmann, Zool. Jahrbuch., Syst., VI. 1892, p. 562: Henderson, Trans. Linn. Soc. Zool. (2) V. 1893, p. 404.

Dorippe atropos, Lamarck, Syst. Anim. sans. vert. p. 245 (1818).

Dorippe nodulosa, Lamarck, Syst. Anim. sans. vert. p. 245 (1818): Bosc, Hist. Nat. Crust. I. 208, pl. iv. fig. 2; Guérin, Icon. Règne Animal, pl. xiii. fig. 2.

Body and appendages (except the hands and fingers, and the propodites and dactyli of the 1st and 2nd true legs) rather thickly covered with hair.

Extreme length of carapace greater than extreme breadth. Surface of carapace wrinkled and uneven, with about a dozen nodules which are often granular; the regions well defined by grooves and puckers.

The spine at the outer angle of the orbit is long and acute, and usually projects well beyond the level of the frontal teeth: the spine at the inner canthus is huge, curved, serrated along the lower border,

and projects far beyond the frontal teeth: the hood-like fold, on either side of the front, that covers the base of the eyestalks, has its angles not pronounced.

The lateral margins of the carapace are denticulated up to a stoutish tooth near the middle of the branchial border.

The abdomen of the male has both on the second and on the third terga a transverse row of 3 tubercles, the middle one large rounded and polished, the lateral ones smaller and acute, and one stout tubercle in the middle line on the fourth tergum: in the female the third fourth and fifth terga are transversely carinate, the carinæ being denticulate, and one tooth on the third and 4th terga, in the middle line, being much enlarged; the second tergum is also transversely carinate, but bluntly and indistinctly.

The chelipeds of the adult male are asymmetrical, the hand of one side being greatly swollen and being a good deal broader than long: in both chelipeds the ischium merus and carpus have the outer surface covered with spinules and acute granules.

The second true leg is more than twice the length of the fourth, and nearly three times the length of the carapace: its carpus like that of the first is traversed longitudinally by two granular crests.

Large males have the carapace 36 millim. long, and 34 millim. in extreme breadth: ovigerous females have the carapace 25 millim. long by 24 millim. broad.

In the Indian Museum collection are very numerous specimens from Mergui, Andamans, East coast of India from Ganjam to Palk Straits, and Persian Gulf.

As Miers states, there can be little doubt that Linnæus' diagnosis (Mus. Lud. Ulr. p. 452) refers to this species. But De Haan long before (Faun. Japon. Crust. pp. 121, 139) had bespoken the identity of *D. dorsipes* and *D. quadridens* and had noticed the confusion by earlier authors of *Cancer dorsipes* of Linnæus with *Cancer dorsipes* of Fabricius.

98. *Dorippe facchino* (Herbst), De Haan.

Dorippe facchino, Herbst, Krabben, I. ii. 190, pl. xi. fig. 68: De Haan, Faun. Japon. Crust. p. 123: Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 163: Miers, 'Challenger' Brachyura, p. 328: Ortmann, Zool. Jahrbuch., Syst. VI. 1892, p. 561: J. R. Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

Dorippe sima, Milne Edwards, Hist. Nat. Crust. II. 157, pl. xx. figs. 11–14: Dana, U. S. Expl. Exp. Crust. pt. I. p. 398: Miers, Ann. Mag. Nat. Hist. (5) V. 1880, p. 317: A. O. Walker, Journ. Linn. Soc., Zool., XX. 1886-90, p. 111.

The body and appendages though on the whole very hairy, are not quite so hairy as in *D. dorsipes;* the chelipeds have the hair confined almost entirely to their borders, especially the upper border; the 1st and 2nd pairs of legs are almost hairless in the female, and in the male have the hair confined to the anterior border of the merus and the posterior border of the merus carpus and propodite; and hair is absent from the convexities of the thoracic sterna.

Extreme length of carapace considerably less than extreme breadth.

The surface of the carapace, when denuded, is either perfectly smooth, or smooth in the middle and finely granular at the sides and in front: the regions are well defined by grooves.

The hood-like fold covering the base of the eyestalks, on either side of the front, has its inner or anterior angle dentiform: the spine at the external orbital angle is broad and suddenly acuminate, and projects to but not beyond the level of the frontal teeth: the spine at the inner canthus is slender, straight, and acute, and projects well beyond the frontal teeth.

The lateral borders of the carapace are sometimes granular, but never denticulate.

The abdomen of the male is unarmed: in the female the 3rd–5th terga are coarsely and bluntly carinate, the carinæ of the 4th and 5th being finely granular. The chelipeds when denuded have all their joints quite smooth: those of the adult male are asymmetrical just as in *D. dorsipes.*

The second true leg is much more than twice, often three times, the length of the fourth, and $2\frac{1}{2}$ to $2\frac{2}{3}$ times the length of the carapace: its carpus, like that of the first is bicarinate, the carinæ being granular under the lens but not to the naked eye.

Large males have the carapace 29 millim. long and 34 millim. in extreme breadth: ovigerous females have the carapace 20 millim. long by 24 millim. broad.

In the Indian Museum are very numerous specimens from the East coast from the mouth of the Hooghly to Madras, and a few from the Andamans. It is common on soft muddy bottoms, and I have rarely found it without a protective bivalve shell and sea-anemone.

99. ? *Dorippe granulata*, De Haan.

Dorippe granulata, De Haan, Faun. Japon. Crust. p. 122, pl. xxxi. fig. 2: Stimpson Proc. Acad. Nat. Sci. Philad., 1858, p. 163: [Targioni-Tozzetti, Zool. Record, 1877, Crust. p. 19]: Ortmann Zool. Jahrbuch., Syst., VI. 1892, p. 561.

Almost exactly resembles *D. facchino* (Herbst), but has the carapace a little more granular and with scanty or obsolete pubescence.

There is almost no hair on the carapace,—none sufficient to conceal its grooving and texture: on the chelipeds there is, on the upper edge, extending along basal part of finger, a narrow fringe of hair, and on the lower edge a narrow fringe extending as far as the end of the merus: on the first two pairs of true legs there is no hair at all in either sex; and on the last two pairs of legs there is not very much hair.

The chelipeds of males that are as big as the largest ovigerous females are hardly asymmetrical.

Ovigerous females have the carapace 14 millim. long and 16 millim. in extreme breadth.

In the Indian Museum collection are 21 specimens from various stations along the shores of the Bay of Bengal from Mergui to Madras, one of these—the smallest and most immature of all—belongs to Dr. Anderson's Mergui collection and is referred to in Dr. de Man's report (J. L. S., Zool., Vol. XXII) as allied to *D. granulata*.

If they are not De Haan's species, they are a mere variety of *D. facchino*.

100. *Dorippe astuta*, Fabr.

Dorippe astuta, Fabricius, Ent. Syst. Suppl. p. 361.

Cancer astutus, Herbst, Krabben, III. iii. 45, pl. lv. fig. 6.

Dorippe astuta, Bosc, Hist. Nat. Crust. I. 208: Milne Edwards, Hist. Nat. Crust. II. 157: Haswell, Cat. Austral. Crust. p. 136: A. O. Walker, Journ. Linn. Soc., Zool., Vol. XX. 1886–90, p. 111: Ortmann, Zool. Jahrbuch., Syst., VI. 1892, p. 562: Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 405.

Body and appendages not pubescent as in *D. dorsipes* and *facchino*, but covered with short distant hairs that are not very plainly visible to the naked eye: the hairs on the edges of the propodites and dactyli of the first two pairs of true legs, however, form a long thick fringe.

The carapace is extremely flat, almost laminar; its surface is smooth, and the regions are defined by grooves.

Extreme length of carapace a little greater than extreme breadth.

The spine at the outer angle of the orbit does not nearly reach to the level of the tip of the frontal teeth: the part of the carapace that covers the base of the eyestalk is not hood-like, and has not its angles pronounced: the spine at the inner canthus of the orbit is quite rudimentary.

The lateral margins of the carapace are smooth. The abdomen of the male is unarmed, that of the female has the 3rd and 4th terga bluntly and very inconspicuously carinate transversely.

The chelipeds are smooth when denuded; in the adult male they are asymmetrical just as in *D. dorsipes* and *facchino*.

The second true leg is three times as long as the carapace, and very much less than twice the length of the fourth leg.

The adult male has the carapace 12 millim. long and 11·5 millim. broad, as has also the apparently adult female.

In the Indian Museum collection are eight specimens from the Andamans, Mergui, Orissa coast, and Karáchi.

Several of them are encrusted with a small species of *Scalpellum*, and one carries across its back a large (inhabited) worm-tube, which is said by Dr. Giles to be a habit with this species.

101. *Dorippe polita*, Alcock and Anderson.

Dorippe polita, Alcock and Anderson, J. A. S. B., Vol. LXIII. 1894, pt. 2, p. 208, and Ill. Zool. 'Investigator,' Crustacea, pl. xxiv. fig. 4 (*in the press*).

General surface of the body and appendages smooth hard polished and free of hairs: there are a few scanty hairs on the edges only of some of the joints of the chelipeds and external maxillipeds.

The extreme length of the carapace is a very little less than the extreme breadth: the grooves that define the regions are shallow and not very conspicuous. The end of the endostomial channel projects between, and a little beyond the tips of the frontal teeth; and has its free edge emarginate, so that the front appears to consist of four sharp lobes, the median two of which are on a lower level than the other two.

The spine at the outer angle of the orbit is broadly triangular, its tip scarcely surpasses the level of the tips of the frontal teeth: the spine at the inner canthus is blunt and very small and inconspicuous: the portion of the carapace that covers the base of the eyestalk is, as in *D. astuta*, in simple continuity with the side of the front.

The abdominal terga of the female are smooth and polished.

The second pair of true legs are about $2\frac{1}{3}$ times the length of the carapace and are very much less than twice the length of the fourth pair; their carpopodites, like those of the first pair, are faintly bicarinate. The pleura covering the bases of the last two pairs of legs are singularly large.

The larger of two ovigerous females in the Indian Museum collection has the carapace 11·5 millim. long and 12 millim. in extreme breadth.

Ethusa, Roux.

Ethusa, Roux, Crust. de la Méditerranée, pl. xviii. and text relating thereto.

Ethusa, Milne Edwards, Hist. Nat. Crust. II. 161.

Ethusina, S. I. Smith, 'Albatross' Crustacea, 1883, in Ann. Rep. U. S. Comm. Fish, &c., 1882 (1884).

Ethusa, Miers, 'Challenger' Brachyura, pp. 328, 331.

Carapace shaped much as in *Dorippe*. The front consists of two laminar teeth each of which again is bifid at tip: on either side of the front, and separated from it by a deep cleft, is a long flat tooth or spine formed by the prolongation of the antero-external angle of the carapace, and forming the outer angle of the orbit. There is practically no orbital floor. The antennules fold obliquely: they are large, but fold fairly well into their fossæ. The antennæ have a long flagellum: their basal joint is inserted between the eyestalk and the basal antennulary joint, but on a slightly lower level.

The buccal cavern is elongate-triangular and does not extend to the front: the external maxillipeds cover only its basal three-fourths, or thereabout, somewhat as in *Dorippe*, but the distal part is closed in by stout foliaceous processes of the first maxillipeds. The flagellum or palp of the external maxillipeds arises near the antero-external angle of the rather broad merus, and is completely exposed in flexion.

The afferent branchial orifices are wide openings immediately in front of the bases of the chelipeds.

The chelipeds in the adult male are often unequal: the legs have the same form and relations as in *Dorippe*, but the last two small and dorsally placed pairs are not subchelate, although their little hook-like dactylus folds backwards. The dactyli of the 1st and 2nd pairs are palmulate and are very long and stout. The abdomen of the male usually consists of 5 pieces, the 3rd–5th terga being fused, that of the female consists of 7 separate terga. As in *Dorippe* the first three terga are visible in a dorsal view.

There is very little hair about the carapace and larger appendages.

In the Indian seas the species of this genus are, so far as is known, found only at depths of between 200 and 1,300 fathoms.

Key to the Indian species of Ethusa.

I. Carapace barely longer than broad: basal antennulary joint not abnormally enlarged and swollen: eyestalks freely movable:—

1. Branchial regions much swollen, and causing a strong bulge of the lateral borders of the carapace posteriorly: external orbital spines long slender acute, and projecting obliquely:—

i. External orbital spines projecting beyond the frontal spines ..... *E. indica.*

ii. External orbital spines not projecting to the level of the frontal spines ... *E. pygmæa.*

2. Lateral borders of the carapace gradually convergent without any strong bulge in their posterior (branchial) part: external orbital spines short broad flat triangular, with a mucronate tip ..... *E. andamanica.*

II. Carapace manifestly longer than broad: basal antennulary joint enormously enlarged and swollen, globular in shape, pushing the eyes permanently outwards:—

1. Eyes practically immobile: chelipeds in the male symmetrical..... *E. investigatoris.*

2. Eyes preserving good power of movement: one cheliped in the male very markedly larger than the other..... *E. desciscens.*

102. *Ethusa indica*, Alcock.

Ethusa indica, Alcock, Ann. Mag. Nat. Hist., May, 1894, p. 405, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 2, ♀.

Carapace convex; its extreme length, including the frontal teeth, in the male only just exceeds, and in the female equals, its extreme breadth; its surface is finely and closely granular almost everywhere, except sometimes on the cardiac-intestinal region.

The branchial regions are much swollen, both dorsally and laterally, the lateral swelling making the carapace more than one-third broader across the middle of the branchial regions than across the bases of the external orbital spines. The cardiac-intestinal region is small and well defined, and although it is tumid it is commonly sunk below the level of the branchial convexities. The anterior regions of the carapace are undefined.

The spine at the external orbital angle is broad-based, but long slender and acute: it projects obliquely outwards well beyond the tips of the frontal teeth. The two pairs of frontal teeth are longish and acute—the outer pair being somewhat the longer: they as well as the external orbital spine are a good deal concealed in a fringe of long hairs.

The eyestalks are short slender and freely movable: the eyes are often a little deficient in pigment.

The basal antennulary joint is not abnormally enlarged.

The chelipeds in the adult male only are asymmetrical, all the joints of one side being enlarged in all dimensions: the smaller cheliped is hardly as stout as the first two pairs of legs.

The second pair of true legs are not very much longer than the first: in the adult male they are a little more than three times the

length of the carapace, and slightly more than three times the length of the 4th (last) pair; in the female they are not quite three times the length of the carapace, and about $2\frac{3}{4}$ times the length of the 4th pair.

The abdomen of the male consists of 5 pieces, the 3rd–5th terga being fused together.

The extreme length of the carapace is in the fully adult male 16·5 millim., in the fully adult female 15 millim.; the breadth 16 millim. in the male, 15 millim. in the female.

Has been dredged in the Andaman Sea at 240 fms., in the "Swatch" of the Gangetic Delta at 409 and at 405 to 285 fms., in the Laccadive Sea at 696 fms., off the Maldives at 719 fms., and off both coasts of Ceylon at 406 to 296 fms.

103. *Ethusa pygmæa*, Alcock.

Ethusa pygmæa, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 5, ♀.

Distinguished from *E. indica* only in the following particulars:—

(1) its size is much smaller, the largest known specimen—an ovigerous female—having the carapace slightly over 6 millim. long and nearly 7 millim. broad:

(2) the external orbital spines, though of the same slender acute shape, are not so prominent, not reaching as far as the tips of the frontal teeth:

(3) the anterior regions of the carapace are plainly defined by grooves.

Andaman Sea 188 to 220 fathoms, and 240 to 220 fms.

104. *Ethusa andamanica*, Alcock.

Ethusa andamanica, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 405, and Ill. Zool. 'Investigator,' Crust. pl. xiv. fig. 8, young ♀.

Carapace flat, its extreme length only just exceeds its extreme breadth, its surface finely granular under the lens, but smooth to the naked eye.

The branchial regions are a little tumid dorsally, but do not bulge laterally, so that the convergent lateral borders are nearly straight.

The external orbital spine is broadly triangular, with a mucronate tip which does not quite reach to the tips of the frontal spines; these also are acutely triangular, and all are a good deal hidden by a fringe of long hairs.

The eyestalks are short and rather stout, movable, but not very freely so: the eyes are not deficient in pigment. The basal antennulary joint is not enlarged.

The chelipeds of the adult male are unknown : in the female they are not so stout as the first two pairs of legs.

The second pair of legs in the female (adult male unknown) exceed the first almost by the length of the dactylus, they are three times the length of the carapace and about $2\frac{1}{2}$ times the length of the 4th pair.

The extreme length of the carapace of the largest specimen, which is not adult, is 9·5 millim., the extreme breadth 9 millim.

Andaman Sea 188 to 220 fms., and 238 to 290 fms.

This species may possibly be only a variety of *Ethusa orientalis*, Miers, Challenger Brachyura, p. 330, pl. xxviii. fig. 4.

105. *Ethusa* (*Ethusina*) *investigatoris*, n. sp.

Carapace manifestly longer than broad, somewhat convex, smooth to the naked eye though finely granular under the lens.

The branchial regions are a good deal swollen both dorsally and laterally, bulging out the lateral margins and making the carapace a third broader across the middle of the branchial regions than across the bases of the external orbital spines.

The cardiac-intestinal region is well-defined and tumid, but not sunk below the level of the branchial convexities : the anterior regions of the carapace are fairly well defined.

The frontal portion of the carapace is separated from the rest of the carapace by a transverse groove or crease. The external orbital spine is long and needle-like, but its tip falls considerably short of the tips of the rather long acute frontal spines.

The basal antennal joint is huge and swollen, almost globular in shape. Owing to its size the eyes are pushed outwards until the eye-stalks have come to lie almost in the transverse axis of the carapace, with the tips of the eyes just visible, dorsally, beyond the lateral edge of the external orbital spine ; and in this position they are almost immovably fixed.

The chelipeds in the apparently adult male are symmetrical and are not much stouter, except as to the hands, than the first two pairs of legs ; the hands, however, are somewhat enlarged.

The second pair of true legs exceeds the first by about a third of the length of the dactylus ; they are more than three times the length of the carapace, and about $2\frac{3}{4}$ times the length of the 4th pair.

The abdomen of the male consists of 5 pieces, the 3rd–5th terga being fused together.

Length of carapace of an adult male 12·3 millim., extreme breadth 11·3 millim.

Colours in life milk-white with the tip of the legs faint pink.

Bay of Bengal 1300 fathoms, Laccadive Sea 1200 fms.

This species may possibly be only a variety of *Ethusa* (*Ethusina*) *gracilipes*, Miers, Challenger Brachyura, p. 332, pl. xxix. fig. 1.

106. *Ethusa* (*Ethusina*) *desciscens*, n. sp.

Only differs from *E. investigatoris* (1) in its smaller size, (2) in having the eyestalks somewhat more mobile, and (3) in having the hand of one cheliped (in the male) much larger than the other.

I should have regarded it as a variety of *E. investigatoris* but that two specimens coming from very different localities and depths present the same peculiarities.

Length of carapace of largest specimen 9 millim., extreme breadth 8 millim.

Andaman Sea 265 fathoms, Laccadive Sea 912 to 931 fms.

Cymonomops, Alcock.

Cymonomops, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406.
Allied to *Cyclodorippe*, *Cymonomus*, etc.

Carapace of the *Dorippe* type (that is to say having its greatest breadth at its extreme posterior limit and leaving about half of the abdominal terga exposed to dorsal view), but arched anteriorly almost in a semicircle; its regions well defined in much the same way as *Dorippe*. The front is narrow and the whole fronto-orbital region lies well inside the semicircular curve of the antero-lateral margins: the narrow front ends in two little teeth between and beyond which can be seen the roof of the greatly prolonged buccal cavern, as in *Dorippe polita*. On either side of the front is a spine that forms the roof of the orbit, and outside of this spine, and separated from it by a deep notch, is a spine that forms the outer wall of the orbit.

The eyestalks are slender, moderately long, and freely movable: the eyes are almost without pigment.

The antennules have their basal joint lodged in a deep crevice between the edge of the anterior prolongation of the buccal cavern and the antennæ: their long flagellum cannot be concealed in flexion. The antennæ are large, but are much smaller than the antennules.

The buccal cavern is of great size,—not much less than half the length of the body, and is gradually narrowed anteriorly, and prolonged beyond the tip of the front: it is closed, except at its extreme frontal tip, by the long narrow external maxillipeds, the merus of which is not very much shorter than the ischium measured along the inner border and the flagellum of which is expossed in flexion: the long narrow pointed exognath is not much longer than the ischium: beneath the

external maxillipeds the anterior prolongation of the buccal cavern is closed in below by a lamellar process of the first maxillipeds.

The chelipeds in both sexes are short, massive, and equal and symmetrical: the hands are of the chopper-shaped, almost subcheliform, Raninoid type, the stout fingers being almost at right angles to the long axis of the hand.

The first and second pairs of true legs are stout and are of great length, their merus being of relatively enormous length: the third and fourth pairs on the other hand, which are dorsal in position as in *Dorippe*, are extremely short and of filiform tenuity.

The abdomen in both sexes consists of six segments: in the male two or three of them are fused and the whole abdomen is very small, in the female the last segment is of great size.

[? The afferent branchial opening appears to lie in the deep crevice between the base of the antennæ and the edge of the buccal frame in which the basal joint of the antennules is lodged.]

107. *Cymonomops glaucomma*, Alcock.

Cymonomops glaucomma, Alcock, Ann. Mag. Nat. Hist., May 1894, p. 406, and Ill. Zool. 'Investigator,' Crustacea pl. xiv. fig. 9.

Carapace subcircular; it and the appendages are very closely and finely granular beneath a dense pubescence. The front consists of three deeply cut lobes, the middle one of which is the true front and is the largest and most prominent. The middle lobe again is slightly cleft at the tip, and in the cleft is to be seen projecting the roof of the remarkably prolonged buccal cavity.

The external orbital angle, which is somewhat ventrad in position, also forms a projecting tooth, so that the orbito-frontal region, which is sharply delimited from the rest of the inflated carapace, has the form of a five-pronged crest or crown. The regions of the carapace are plainly delimited, excepting only in the case of the boundary between the gastric and cardiac regions. The pterygostomian regions are most remarkably puffed out.

The abdomen (in the female) is large, and the terminal segment has the form of a broad semicircular plate, broader than any of the other segments and nearly as long as all of them put together: in the male the abdomen is very small.

The orbits are capacious, but the eyestalks are slender and the eyes are unpigmented and semi-opaque.

The antennules, which are much larger and longer than the antennæ, are incapable of flexion beneath the front.

The external maxillipeds are of great length, in correspondence with

the remarkable trough-like prolongation of the buccal cavity, which they completely close in below; their meropodite, which is prolonged far beyond the insertion of the palp, covers the bases of the antennules and antennæ, their tips in fact being visible from above; the slender exopodite does not much surpass the ischium.

The chelipeds are short but massive, and are equal, the merus is curved, the carpus is very small, the palm is large and tumid, and the fingers which are set almost at right angles to the hand, are broad, compressed, pointed, very closely apposable, and have their cutting-edge very finely denticulated.

The second and third legs are of great length, being more than four times the length of the body, the merus forming more than half their extent; their dactylus is filiform and is not much longer than their protopodite. The fourth and fifth legs have the family position, but are mere rudiments, being of hair-like tenuity and only about three-fourths of the carapace in length; the fifth ends in a hook-like dactylus.

A female from the Andaman Sea, 405 fathoms, has the following dimensions:—Length of carapace 6·5 millim., breadth 6·5 millim., length of cheliped 9 millim., length of second leg 28·5 millim., of fourth leg 4·5 millim. A male from the Andaman Sea, 265 fathoms, is smaller.

Colour in the fresh state chalky pink.

Family RANINIDÆ.

Raniniens, Milne Edwards, Hist. Nat. Crust. II, 190.
Raninoidea, De Haan, Faun. Japon. Crust. p. 136.
Raninidea, Dana, U. S. Expl. Exp. Crust. pt. I. pp. 400, 403.
Raninidea, Henderson, 'Challenger' Anomura, p. 26.

Carapace much longer than broad, remarkably elongate and convex from side to side, commonly obconical or obovate in outline, the greatest breadth being at or close behind the level of the front. Abdomen narrow in both sexes, the greater number of the terga fully exposed in a dorsal view. The sternum is elongate, broad between the first pair or first two pairs of legs, and then becoming narrow and finally linear.

The true front is narrow: in the same plane with it the antero-external angle of the orbit is usually produced, somewhat as in *Dorippe*, to form a spine; and between the two is the orbit.

Except in the deep-sea forms the eyestalks are long. The orbits are very complete, except sometimes on the ventral aspect, where the large basal joints of the antennules and antennæ serve in large part as an orbital floor.

The antennules are large, but do not fold into fossettes. The antennæ also are large, and arise on a plane more or less ventrad of the antennules.

The buccal cavern is remarkably elongate, and is completely closed by the external maxillipeds. As in all other *Oxystoma* the efferent branchial channels form a canal in the middle of the endostome, which canal is covered by a lamellar prolongation of the exopodites of the first maxillipeds: as in *Dorippe* the canal is prolonged forwards between the bases of the antennules.

As in the *Leucosiidæ* the afferent branchial channels are not found in front of the bases of the chelipeds.

Somewhat in the same way as in the *Leucosiidæ* the palp of the external maxillipeds is small and arises at the far end of a groove along the inner edge of the merus, so as to be completely concealed in repose: the exognath is very narrow, and, as in the *Tymolinæ*, does not reach very far beyond the end of the ischium of the endognath.

Except in *Zanclifer* the chelipeds have the hand broad flat and somewhat chopper-shaped, the fingers (which form the head of the chopper) being at right angles, or nearly so, with the long axis of the hand; and as the immobile finger springs from a very broad base, the chelæ rather resemble subchelæ.

The legs commonly have the propodite broad or foliaceous, and the dactylus foliaceous or very broadly palmulate, somewhat as in *Matuta*: the last pair of legs is in, and the penultimate pair approaches, the dorsal plane of the body.

The genital ducts of the male perforate, and protrude far beyond, the bases of the fifth pair of legs: those of the female perforate the bases of the third pair of legs.

The following genera belong to this family. Indian genera are printed in Roman type and those represented in the Indian Museum collection are marked with an asterisk:—

Family **Raninidæ**.

* Cosmonotus.

* Lyreidus.

* Notopus.

Notopoides, Henderson, 'Challenger' Anomura, p. 29.

Ranilia, Milne Edwards, Hist. Nat. Crust. II. 195.

* *Ranina*, Lamarck, Milne Edwards, Hist. Nat. Crust. II. 191.

* Raninoides.

Raninops, A. Milne Edwards, Bull. Mus. Comp. Zool. VIII. 1880. p. 34.

Zanclifer, Henderson, 'Challenger' Anomura, p. 34.

Key to the Indian genera of Raninidæ.

I. Last pair of legs of normal size: antennæ with a very stout peduncle that hides the antennules: antennary flagellum long and stiff:—

1. A well-developed rostral spine..... *Notopus.*
2. A V-shaped excision in the carapace in place of a rostrum..... *Cosmonotus.*

II. Last pair of legs abnormally small and slender —almost filiform: antennary peduncle not completely hiding the antennules: antennary flagellum small:—

1. Fronto-orbital border more than half the width of the carapace: sternum broad as far as the third pereiopods: merus of the external maxillipeds shorter than the ischium ..... *Raninoides.*
2. Fronto-orbital border less than half the width of the carapace: sternum broad only as far as the second pereiopods: merus of the external maxillipeds a little longer than the ischium ..... *Lyreidus.*

Notopus, De Haan.

Notopus, DeHaan, Faun. Japon. Crust. pp. 137, 138.
Notopus, Henderson, 'Challenger' Anomura, p. 31.

Carapace obovate or obconical in outline, strongly convex from side to side, nearly smooth: regions undefined. Fronto-orbital border more than half the breadth of the carapace. Eyes distinct, eyestalks long slender and cylindrical, orbits oblique.

Antennules much smaller than the antennæ. Antennæ with a long very stout peduncle and long stout flagellum, the peduncle concealing the antennulary peduncle. Merus of the external maxillipeds a little shorter than the ischium, and having its inner border thickened and raised. Sternum broad between the chelipeds and then suddenly becoming very narrow. Last pair of legs of normal size, arising a little in advance of the penultimate pair.

The abdomen in both sexes has all 7 terga separate.

108. *Notopus dorsipes*, (Fabr.) De Haan.

Pediculus marinus, Rumph, Amboin. Rariteitk. I. 29, pl. x. fig. 3.
Hippa dorsipes, Fabricius, Ent. Syst. II. 475.
Albunea dorsipes, Fabricius, Ent. Syst. Suppl. p. 397.
Ranina dorsipes, Latreille, Hist. Nat. Crust. et Ins. VI. 133, [and Encycl. Method. X. 268, pl. 287, fig. 2]: Milne Edwards, Hist. Nat. Crust. II. 195.

Notopus dorsipes, DeHaan, Faun. Japon. Crust. p. 139, pl. xxxv. fig. 5: Studer, Abh. Ak. Berl. 1882 (1883) p. 17, pl. i. figs. 6 *a–b* and pl. ii. figs. 7 *a–d*.]

The greatest breadth of the carapace—at the fronto-orbital border—is about two-thirds the greatest length.

On the fronto-orbital border are 5 spines of about equal size, separated by deep bights, the middle spine being the true front or rostrum: the outermost spines on either side form the antero-external angles of the carapace, are on a different plane from the others, and are joined across the carapace by a serrated ridge.

The carapace is a good deal pitted in the centre: the lateral borders in their anterior half have, like the surface of the merus of the external maxillipeds and of the greater part of the pterygostomian region, numerous squamiform granules; in their posterior half the lateral borders are finely raised, and milled. A raised ridge traverses the carapace in the middle line from the tip of the front nearly to the posterior border. The trigonal ischium of the chelipeds is somewhat swollen and has its outer surface tattooed with linear dents with hairy edges; the carpus has its dorsal surface serrated; the hand has hairy linear dents and squamiform rows of serrations on both its surfaces, but especially on the outer; and the dactylus has a smooth cutting edge and closes against a single distinctly large tooth at the tip of the immobile finger.

The true legs have one or both edges of many of their joints scantily fringed with long stiff hairs: except in the case of the last pair—in which the carpopodites and propodites are foliaceously expanded—these joints are only moderately expanded; and except in the case of the penultimate pair—in which the dactylus is foliaceous—this joint is broadly palmulate.

In the Indian Museum collection are specimens from the Andamans, and from off the Malabar coast 45 fathoms.

Cosmonotus, Adams & White.

Cosmonotus, Adams & White, 'Samarang' Crust. p. 60, 1848.
Cosmonotus, Dana, U. S. Expl. Exp., Crust. pt. I. p. 401.
Cosmonotus, Henderson, 'Challenger' Anomura, p. 32.

Carapace elongate-heptagonal in outline, strongly convex, the summit of the convexity forming a sharp mid-dorsal ridge. *Instead of a "front" there is a V-shaped excision*, filled by the basal joints of the eyestalks. The eyes are distinct, the eyestalks are slender and are of remarkable length: each orbit forms a narrow trench just beneath and along almost the whole length of either anterior border of the carapace, the two orbits together forming a very perfect and obvious V.

The antennules are almost hidden by the much larger and stouter antennæ, as in *Notopus*.

The maxillipeds, legs, sternum and abdomen are as in *Notopus*.

109. *Cosmonotus grayii*, Ad. & Wh.

Cosmonotus grayii, Adams and White, 'Samarang' Crust. p. 60, pl. xiii. fig. 3 (P. Z. S. 1847, p. 227, fig., and Ann. Mag. Nat. Hist. (2) II. 1848, p. 287): Stimpson, Proc. Acad. Nat. Sci. Philad. 1858, p. 241: Henderson, 'Challenger' Anomura, p. 33: [Cano, Boll. Soc. Nat. Napol. III. 1889, p. 256].

The carapace is unevenly covered with pits and dents which give it, when examined with a lens, a somewhat squamiform appearance. There is a small denticle on either side of the frontal notch and a claw-like spinule at either antero-external angle of the carapace—this is all the armature. The pterygostomian region is granular. The outer edge of the exognath is thickly fringed with hair, the merus and the outer margin of the ischium of the endognath are granular.

The chelipeds are hairy along the dorsal edge, and the edges of the legs—of the last pair especially—are hairy. The chelipeds are also a good deal pitted and dented, like the dorsum of the carapace.

The movable finger is rather strongly curved, and owing to the prominence of a single tooth just beyond the middle of the cutting edge, is curiously sickle-shaped.

In the Indian Museum collection is a single male from the Persian Gulf.

Raninoides, Milne Edwards.

Raninoides, Milne Edwards, Hist. Nat. Crust. II. 196.
Raninoides, Henderson, 'Challenger' Anomura, p. 27.

Carapace remarkably elongate-obovate, strongly convex from side to side, about twice as long as broad, its surface for the most part smooth, the regions undefined. Fronto-orbital border slightly less than the greatest width of the carapace. Eyes small but distinct, eyestalks broadly dilated at base, orbits slightly oblique.

Antennules about equal in size to the antennæ: antennæ with a stout peduncle and a rather short slender flagellum, the peduncle not concealing the antennulary peduncle. Merus of the external maxillipeds shorter than the ischium; its edges slightly thickened and raised. Sternum broad between the chelipeds and as far as the bases of the second pair of true legs, then becoming extremely narrow.

Last pair of legs abnormally short and slender, arising much in advance of the penultimate pair. The abdomen in both sexes consists of 7 separate segments.

110. *Raninoides personatus*, White, Henderson.

Raninoides personatus, White MS., Henderson 'Challenger' Anomura p. 27 pl. ii. fig. 5.

Carapace twice as long as broad. The lateral border in its posterior half is defined by a fine raised and milled line, and at either external orbital angle is prolonged into a spine, at a distance behind which equal to the distance between it and the rostrum is a second smaller, but still large, spine. The carapace between the two latter spines is finely punctate and in places granular, elsewhere it is smooth and polished.

The front consists of three teeth, the middle one of which alone is large and prominent forming the true rostrum, the lateral teeth being small: between each of these small lateral teeth and the external orbital spine, and separated from both by a fissure, is an angular lobe that completes the roof of the orbit. The whole fronto-orbital border is hairy. The pterygostomian regions are densely granular in a well defined band that occupies much more than their outer half.

The chelipeds have the ischium armed distally, on its inner border with a sharp slender spine: two similar spines occur towards the distal end of the carpus—the larger one being on the outer border, the smaller on the dorsal surface: a similar spine is found towards the far end of the outer border of the hand, and three occur along the inner border of the hand: the dactylus has a smooth cutting edge, but the opposed edge of the immobile finger is very sharply laciniate up to a sharp terminal spine. There is no spine on the outer edge of the dactylus. The third pair of true legs has its merus on both edges and the other joints on the posterior edge fringed with long stiff hairs, the second pair has similar hairs on the posterior edge of merus carpus and propodite, the first pair on lower edge of propodite.

Excluding the filiform last pair, the other legs have the carpus dorsally carinate, and the propodite and dactylus foliaceous.

In the Indian Museum collection are numerous specimens from the coasts of the Bay of Bengal, from 12 to 70 fathoms.

111. *Raninoides serratifrons*, Henderson.

Raninoides serratifrons, Henderson, Trans. Linn. Soc., Zool., (2) V. 1893, p. 408, pl. xxxviii. figs. 10–12.

Differs from *R. personatus* Henderson in the following particulars:—

(1) the rostrum is carinated, and it, as well as the dentiform lobe at either side of its base, has the edge sharply clearly and uniformly serrated:

(2) between the dentiform lobe at the base of the rostrum and the

external orbital spine is, not an angular lobe, but a sharp spine:

(3) the spine on the lateral border behind the external orbital spine is a mere spinule, and the carapace in front of a well defined transverse line that connects these spines is covered with small squamiform granules:

(4) there is no spine on the ischium of the chelipeds; the wrist has its dorsal surface closely covered with somewhat scale-like granules; the hand has its inner surface covered, but not nearly so closely, with rather larger granules and has its outer edge sharply bicarinate:

(5) the dactylus of the second and third pairs of true legs is sickle-shaped:

(6) the small last pair of legs are stouter.

In the Indian Museum collection are two specimens—a small female from off Ceylon 28 fms., and a large female from off the Malabar coast 45 fms.

Lyreidus, De Haan.

Lyreidus, DeHaan, Faun. Japon. Crust. p. 138.
Lyreidus, Henderson, 'Challenger' Anomura, p. 33.

Carapace elongate-obovate, the antero-lateral margins independent and gradually convergent; strongly convex from side to side and slightly convex from before backwards; smooth and polished, with the regions undefined. Fronto-orbital border less than half the breadth of the carapace. Eyes small; eyestalks short, broad at base, orbits hardly oblique.

Antennules about equal in size to the antennæ: antennæ with a stoutish peduncle and rather short slender flagellum, the peduncle not concealing the antennulary peduncle.

Merus of the external maxillipeds a little longer than the ischium.

Sternum broad as far as the bases of the first pair of true legs, then becoming narrow. Last pair of legs abnormally short and slender, arising well in advance of the posterior pair. The abdomen in both sexes consists of 7 distinct segments.

112. *Lyreidus channeri*, Wood-Mason.

Lyreidus channeri, Wood-Mason, P. A. S. B., August, 1885, p. 104, and J. A. S. B., Vol. LVI. 1887, pt. 2, p. 206, pl. i.
Lyreidus gracilis, Wood-Mason, J. A. S. B., Vol. LVI. 1887, pt. 2, p. 376.

The greatest breadth of the carapace—considerably in rear of the front—is a good deal more than half its greatest length, and is about $2\frac{1}{2}$ times the width of the fronto-orbital border.

The rostrum consists of a simple flat acutely-triangular spine; on either side of it, projecting beyond it, separated from it by a deep bight, and parallel with its tip, is a long acicular spine forming the external orbital angle. The fronto-orbital region is hairy.

The gradually convergent antero-lateral borders are about two-fifths the length of the postero-lateral borders, the junction of the two borders being occupied by a long oblique acicular spine; and nearly midway between this spine and the spine at the external angle of the orbit on either side, is another similar but rather shorter spine. The postero-lateral borders are defined in more than their posterior half by a very fine raised line.

The surface of the carapace is finely and closely punctulate in all its anterior half, as are also the pterygostomian regions.

The eyestalks are broad and flat, and taper to the cornea, which has a somewhat lateral position and is a little deficient in pigment. The arms have a spine or two little spines near the middle of their dorsal surface: the wrist has a large spine in the distal half of its upper border: the hand has its outer (upper) edge carinate up to a subterminal denticle, and has its lower edge cut into two or three sharp teeth: the dactylus has its cutting edge faintly and irregularly sinuous, but by no means denticulate, and the opposed edge of the immobile finger is irregularly and rather bluntly jagged. The legs are almost free from hair, a few hairs occurring on the posterior edge of the propodite and dactylus of the third pair and on the last two joints of the rudimentary fourth pair only: in the first and third pairs the carpus is dorsally carinate and the propodite foliaceously expanded, in the first and second pairs the dactylus is little more than broadly palmulate, and in the third pair the dactylus is foliaceous. The third and fourth abdominal terga are armed each with a median recurved spine, in both sexes.

The largest female in the Indian Museum collection has the carapace 28·5 millim. long, a smaller ovigerous female has the carapace 26·5 millim. long.

Wood-Mason established his two species on two specimens, one of which—*L. channeri*—had suffered a good deal from breakage and imperfect re-growth about the frontal region.

A considerable series of the specimens since obtained shows that the two supposed species are really one.

In the Indian Museum collection are numerous specimens, from the Andaman Sea 220 to 271 fms., from the Bay of Bengal 200 to 405 fathoms, and from both sides of Ceylon 296 to 406 fms.

Uniform salmon-colour in life, white in spirit.

EXPLANATION OF PLATES.

Plate VI.

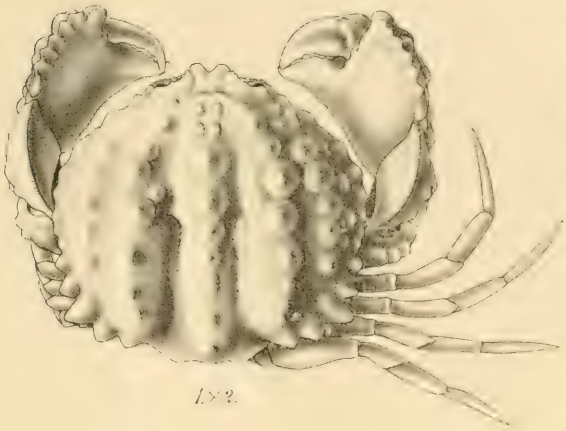
Fig. 1. Calappa pustulosa.
„ 2. Calappa woodmasoni.
„ 3. Pseudophilyra woodmasoni.
„ 4. Leucosia corallicola.
„ 5. Leucosia sima.
„ 6. Leucosia truncata.
„ 7. Pseudophilyra blanfordi.

Plate VII.

Fig. 1. Philyra corallicola.
„ 2. Philyra sexangula.
„ 3. Ebalia woodmasoni.
„ 4. Ebalia diadumena.
„ 5. Nursia blanfordi.
„ 6. Nursia nasuta.
„ 7. Nursia persica.

Plate VIII.

Fig. 1. Heteronucia vesiculosa.
„ 2. Pariphiculus rostratus.
„ 3. Actæomorpha morum.
„ 4. Tlos patella.



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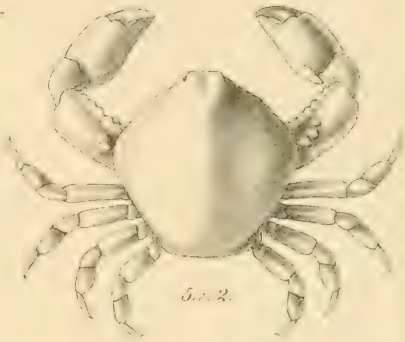

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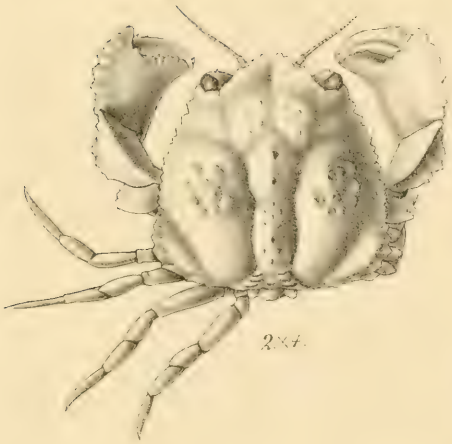

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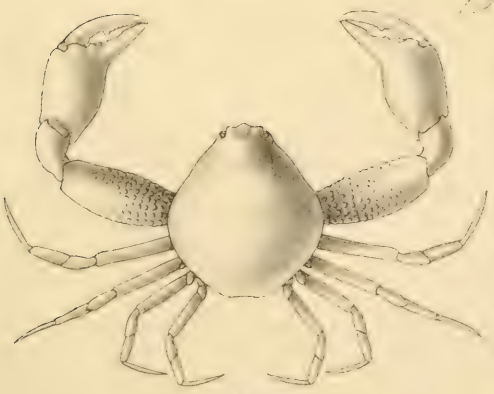
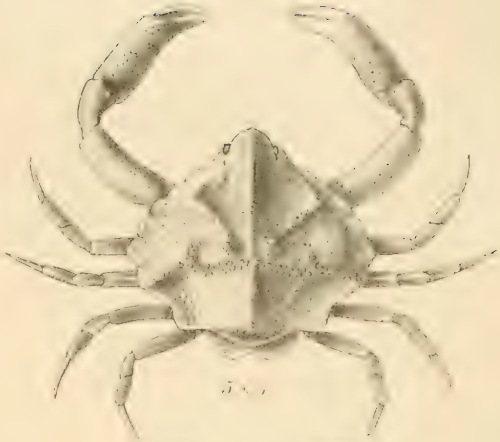


3×3

7×3.

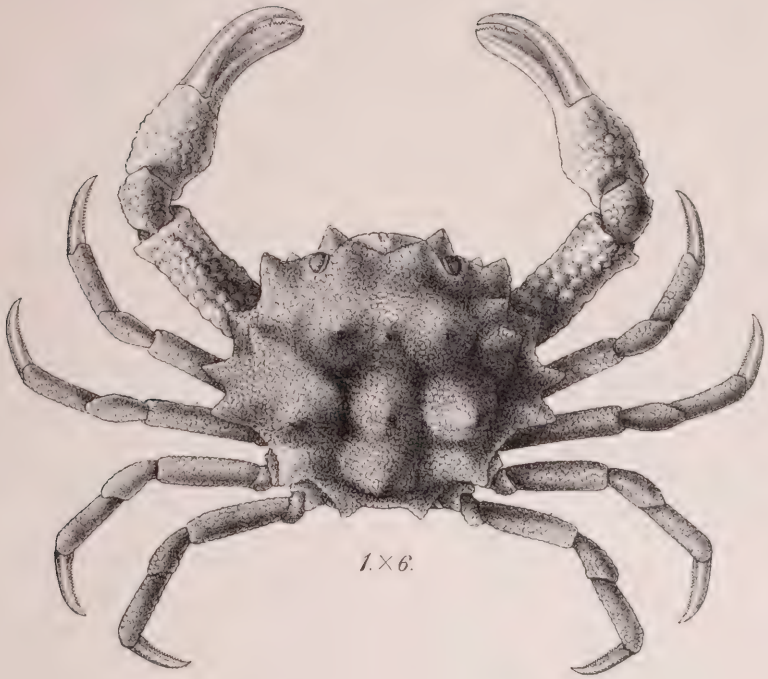
S. C. Mondul del. et. lith.

1. Calappa pustulosa, ♂. 2. Calappa wood-masoni, ♂. 3. Pseudophilyra wood-masoni, ♂.
4. Leucosia corallicola, ♂. 5. Leucosia sima, ♀. 6. Leucosia truncata, ♀.
7. Pseudophilyra blanfordi, ♂.



A.C. Chowdhary & S. C. Mondul del. A.C. Chowdhary lith.

1. Philyra corallicola, ♂. 2. Philyra sexangula, ♂. 3. Ebalia wood-masoni, ♂.
4. Ebalia diadumena, ♀. 5. Nursia blanfordi, ♀.
6. Nursia nasuta, ♂. 7. Nursia persica, ♀.



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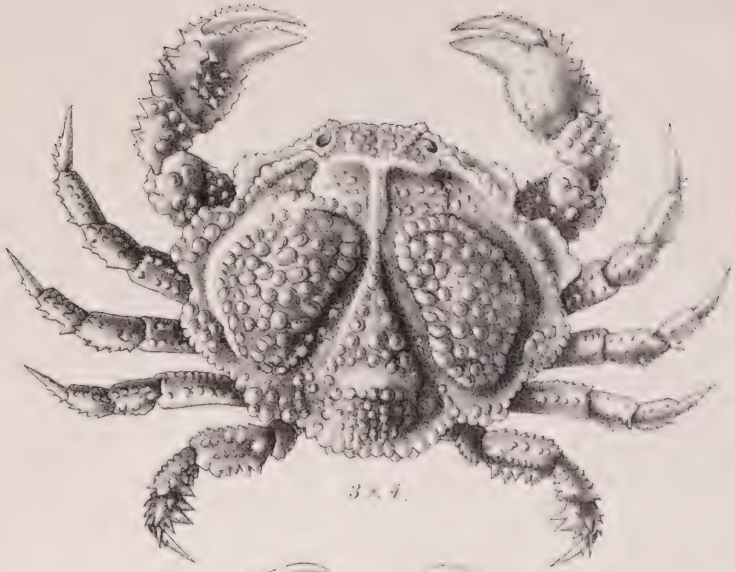

3. × 4.

2.

4. · 5.

S. C. Mondul & A. C. Chowdhary del.

1. Heteronucia vesiculosa, ♀. 2. Pariphiculus rostratus, ♀. 3. Actaeomorpha morum, ♀.
4. Tlos patella, ♀.

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